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THE VASCULAR PLANTS OF THE WESTERN CANADIAN ARCTIC ARCHIPELAGO

BY

A. E. Porsild

1955

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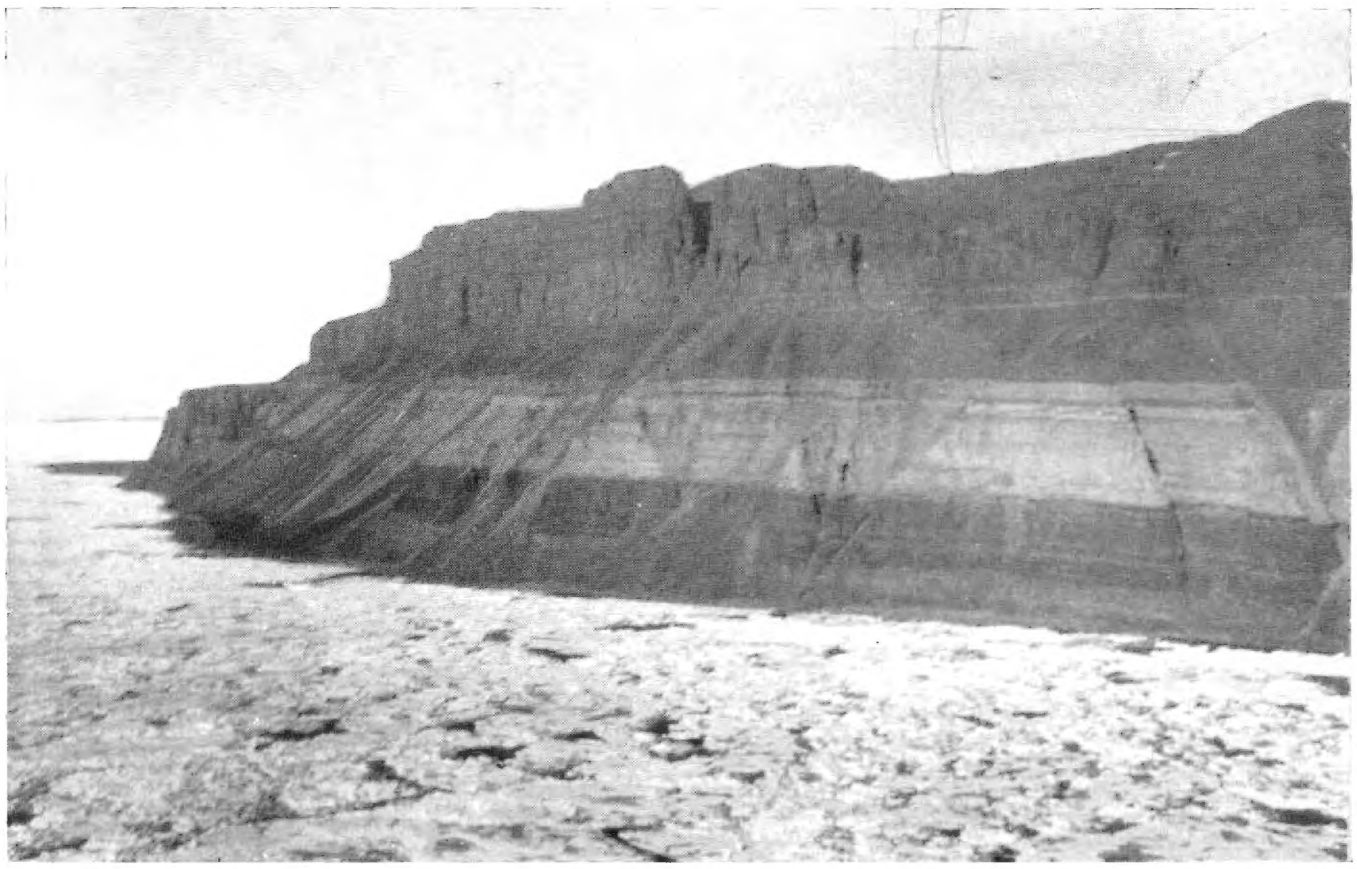
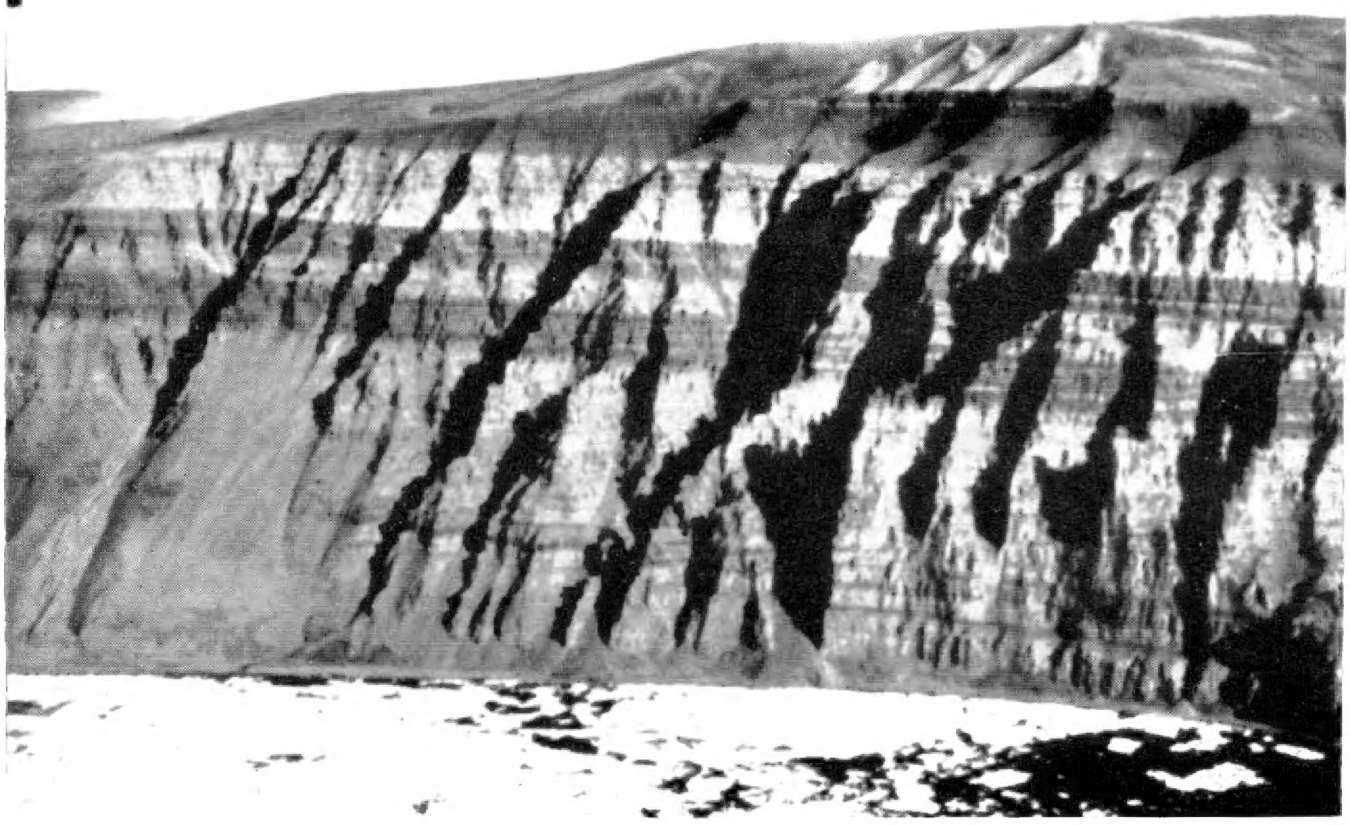


A. Cape Lambton, Banks Island, from the southwest on July 31, 1949. Note almost horizontal trap-sedimentary sequence. The cliffs are approximately 1,500 feet high.



B. Cape Lambton from the west, showing trap-sedimentary sequence dipping slightly toward south.

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ERRATA :

In list of contents p. iv, and under captions on pp. 39 and 51 under Figures 6, 7, 8, 14, and 16 for "Arctic range . . ." read "N. American range . . ." and under Fig. 15 for "Total range . . ." read "N. American range . . ."

p. 43. Bottom line for "arctic range . . ." read "N. American arctic range . . ."
45. 2nd line up for "arctic range . . ." read "N. American range . . ."
47. Line 14 down for "arctic range . . ." read "N. American arctic range . . ."
54. Line 14 up for *"Carex miliaris"* read *"Carex saxatilis* var. *miliaris"*
56. Line 9 down for "arctic range . . ." read "N. American range . . ."
57. Line 6 down for "Total range . . ." read "N. American range . . ."
57. Line 7 down for "arctic range . . ." read "N. American arctic range . . ."
68. Line 28 down for *"C. obtusa"* read *"C. obtusata"*
68. Line 36 down for *"Saussurea integrifolia"* read *"Saussurea angustifolia"*
222. Line 22 up for *"obtusa"* read *"obtusata"*
222. Line 27 up for *"miliaris"* read *"saxatilis* var. *miliaris"*
226. Line 10 down for *"integrifolia"* read *"angustifolia"*

Issued under the authority of
The Minister of Northern Affairs and National Resources

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1955

Price, $2.50

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THE VASCULAR PLANTS OF THE WESTERN CANADIAN ARCTIC ARCHIPELAGO

INTRODUCTION AND ACKNOWLEDGMENTS

The Western Canadian Arctic has long remained among the least accessible regions in the World, and the few expeditions that in the past have succeeded in penetrating beyond normal seasonal limits of navigation have been costly, not only in terms of lost time, equipment, and ships, but also in terms of human life and suffering. It is no wonder, then, that our knowledge of the physiography and natural history of these perpetually ice-bound islands has so long remained fragmentary. More often than not, knowledge had to be gleaned from bits of information and stray specimens brought back by members of exploring expeditions, whose principal care was for a sea-route from the Atlantic to the Pacific, and for the delineation of newly discovered straits, shorelines, and islands.

Greatly improved transportation facilities have made it possible in recent years for scientists to visit and operate from permanent meteorological stations or to travel to and from formerly inaccessible regions by aeroplanes or icebreakers servicing these stations in the Canadian Arctic. In some few instances, private or Government-sponsored expeditions travelling by air have been organized solely for the purpose of physical, geological, or biological reconnaissance.

In the botanical field, nearly all earlier exploring expeditions to the Canadian Arctic have made some contributions. Most of the rather numerous collections of plants that have reached botanical centres and herbaria, however, have consisted mainly of specimens representing ubiquitous and conspicuous species, and have originated mainly from the more accessible peripheral parts of the Archipelago.

In a few instances the botanical collections of early expeditions have been determined by specialists who have prepared lists or catalogues that in due course appeared as appendices to expedition reports. Frequently, however, no such lists were published; nor have there been published any clues as to where the specimens had been deposited. Even in the case of arctic plants actually reported upon, the specimens upon which such reports were based as often as not have had to be discovered by laborious searches through the files of herbaria possessing arctic plants.

H. G. Simmons (1913), therefore, performed a great and valuable service to the cause of Arctic Botany when he compiled and critically evaluated the information then available on the vascular flora of the Arctic Archipelago; and since its appearance his work has remained a standard reference to botanists working on the flora of arctic North America. Simmons, incidentally, was the first professional botanist ever to visit any part of the Arctic Archipelago; for that matter he was the first professional botanist to visit any part of the North American high-arctic. The field experience gained by him during four winters and summers spent in Ellesmere Island as botanist to the Norwegian Arctic Expedition in the *Fram*, 1898–1902, made it possible for him to properly evaluate the botanical data collected by earlier expeditions to the Archipelago.

In preparation for his work Simmons examined all specimens from the Arctic Archipelago preserved in the herbaria of London, Stockholm, and Copenhagen. Some of these plants had been reported upon previously in the botanical appendices or plant lists of earlier arctic expeditions, and others were as yet unreported. Frequently the identity of the plant listed in such early publications was obscure and needed critical study, and the service that Simmons thus performed in bringing together this information into one volume has been invaluable. Of no less value have been Simmons' historical notes on the exploration of the Arctic Archipelago and his list of localities from which botanical collections are known to exist.

In Part I of his comprehensive *Botany of the Canadian Eastern Arctic*, Polunin (1940) has dealt with the vascular flora of the eastern Canadian Arctic lying north of the 60th parallel and east of the 95th meridian. In Part II, he and his collaborators have catalogued *Thallophyta and Bryophyta* (Polunin, 1947), and in Part III Polunin has described the *Vegetation and Ecology* (Polunin, 1948). For his treatment of the vascular flora, Polunin had had access to most of the earlier collections from the Eastern Canadian Arctic, which were cited by Simmons (1913), and in addition had seen a number of specimens lying in North American herbaria that Simmons did not see. Also he had seen most of the more recent and modern collections from that region. Among the latter the most important are those made by the late M. O. Malte, Chief Botanist in the National Herbarium of Canada, who, in 1927, 1928, and 1933, collected extensively in the vicinity of the main points of call of the annual Government supply ship to the Eastern Arctic, and Polunin's own collections made between 1931 and 1936, mainly from the same places visited by Malte.

Though *Botany of the Canadian Eastern Arctic* will long remain a standard reference, practically all plants thus far collected in the Eastern Arctic have come from places in close vicinity to trading and administration centres. Future exploration in some of the less accessible parts of the Eastern Arctic, and particularly in the interior of some of the larger islands, will undoubtedly add substantially to the 246[1] species of vascular plants listed in 1940 from that region. Thus, since 1940 more than a dozen species of vascular plants, not previously recorded from the Arctic Archipelago, have been discovered in Baffin Island alone, mainly in places not previously visited by botanical collectors.

For the present treatment of the vascular flora of the Western Canadian Arctic islands, the writer has, in nearly all instances, verified or re-examined specimens enumerated by Simmons (l.c.).

Although our knowledge of the botany of the Western Archipelago is still inadequate, enough information has, nevertheless, resulted from recent years' exploration to make it worth while bringing together at this time all that is known about the flora of a region that has too long remained an almost blank spot on the botanical maps of North America.

The bulk of the botanical information, published here for the first time, has resulted from the writer's own collection in the course of brief visits in July and August of 1949 to about a dozen points each in Banks and Victoria islands (Porsild, 1950) and to a visit in 1953 to central Axel Heiberg Island. Valuable additional collections, ranging in size from a

[1] Excluding 51 species reported only from districts 6 to 10, i.e., parts of the Eastern Arctic lying outside the Arctic Archipelago proper.

few to scores, or in a few instances to one hundred or more specimens, have been contributed by scientists working in other fields, by surveyors, or by chance travellers to islands of the Western Archipelago, whose collections have been deposited in the National Herbarium of Canada (*See* list of botanical collectors). Their specimens are cited in the text of the present report, and the writer here wishes to express his most sincere appreciation to all such contributors, as well as to Dr. Thorvald Sørensen, Copenhagen, who kindly revised the arctic material of *Puccinellia* in the herbarium of the National Museum of Canada, Ottawa, and furnished descriptions and critical notes for three "new" species. The writer further wishes to express his gratitude and appreciation to his friends, Dr. A. L. Washburn, of Dartmouth College, Hanover, New Hampshire, who invited him to join in an expedition to Banks and Victoria islands in 1949, and Mr. George Jacobsen, who invited him to accompany the Tower Company of Montreal Expedition to Axel Heiberg Island in 1953. Permission is gratefully acknowledged also for the use of five of Dr. Washburn's photographs, reproduced in Plates X and XI. The examination of certain critical specimens in European herbaria has been made possible in part by a grant from the Penrose Fund of the American Philosophical Society.

PHYSIOGRAPHY

Geography

Geographically the Canadian Arctic may be defined loosely as comprising that part of Canada lying north of the tree-line which approximately follows the 50 degree F. (10° C) isotherm for the warmest month of the year. This line, in the delta of the Mackenzie River, in latitude 68° 40′, almost reaches the shores of the Arctic Ocean but, east of Great Bear Lake, owing to the cooling influence of that great inland sea—Hudson Bay—is deflected sharply southwards and cuts diagonally across eastern Mackenzie and central Keewatin districts to James Bay. Here tree growth comparable to that of the Mackenzie Delta is found first near the 52nd parallel, or the latitude of London, England. In the interior of Ungava the tree-line again pushes northward, and only the northernmost parts of the peninsula, beyond a line running from Richmond Gulf to Ungava Bay, is treeless. Along the Labrador Coast, the tree-line is again sharply deflected southwards.

Altogether, as thus defined, the Canadian Arctic comprises approximately 900,000 square miles of land area (2,331,000 sq. km.) of which the Arctic Archipelago contributes about one half; the other half is on the mainland.

For the purpose of administration and trade, the Canadian Arctic has long been divided into an eastern and a western district. The Eastern Arctic is the part that can be reached by ships from the Atlantic, and the Western Arctic comprises a much less accessible area, of which, in ordinary summers, only the southwestern parts can be reached by ships from the Pacific. In recent years most supplies for the Western Arctic have been shipped down the Mackenzie and transferred to small supply ships wintering on the Arctic Coast.

Physiographically, the division of the Canadian Arctic into an eastern and a western section is a fairly natural one, for in the East a high mountain range extends in a north-south direction from Labrador across Baffin, Devon, Ellesmere, and Axel Heiberg islands. This mountain range, which in some sections reaches elevations of 8,000 or even 10,000 feet (2,400–3,000 m.), strongly affects the climate of the rest of the Archipelago, because it acts as a mechanical barrier for the free flow of air from one side to the other. That this is so is illustrated by the annual mean temperature, which at Bache Peninsula, on the east coast of Ellesmere Island, in latitude 79° 10′, is 4° F. (−15° C.); but at Eureka, on the west coast of Ellesmere Island, in latitude 80°, it is −4° F. (−20° C.), whereas the total annual precipitation at Bache Peninsula is 5·19 inches (132 mm.) and only 1·74 inches (44 mm.) at Eureka (Rae, 1951). Two major gaps or breaks occur in this mountain range, which forms the backbone of the Eastern Arctic; the first in Hudson Strait, which separates Ungava-Labrador from Baffin Island, the second in Lancaster Sound, which separates that island from Devon Island. Both are important phytogeographic boundaries.

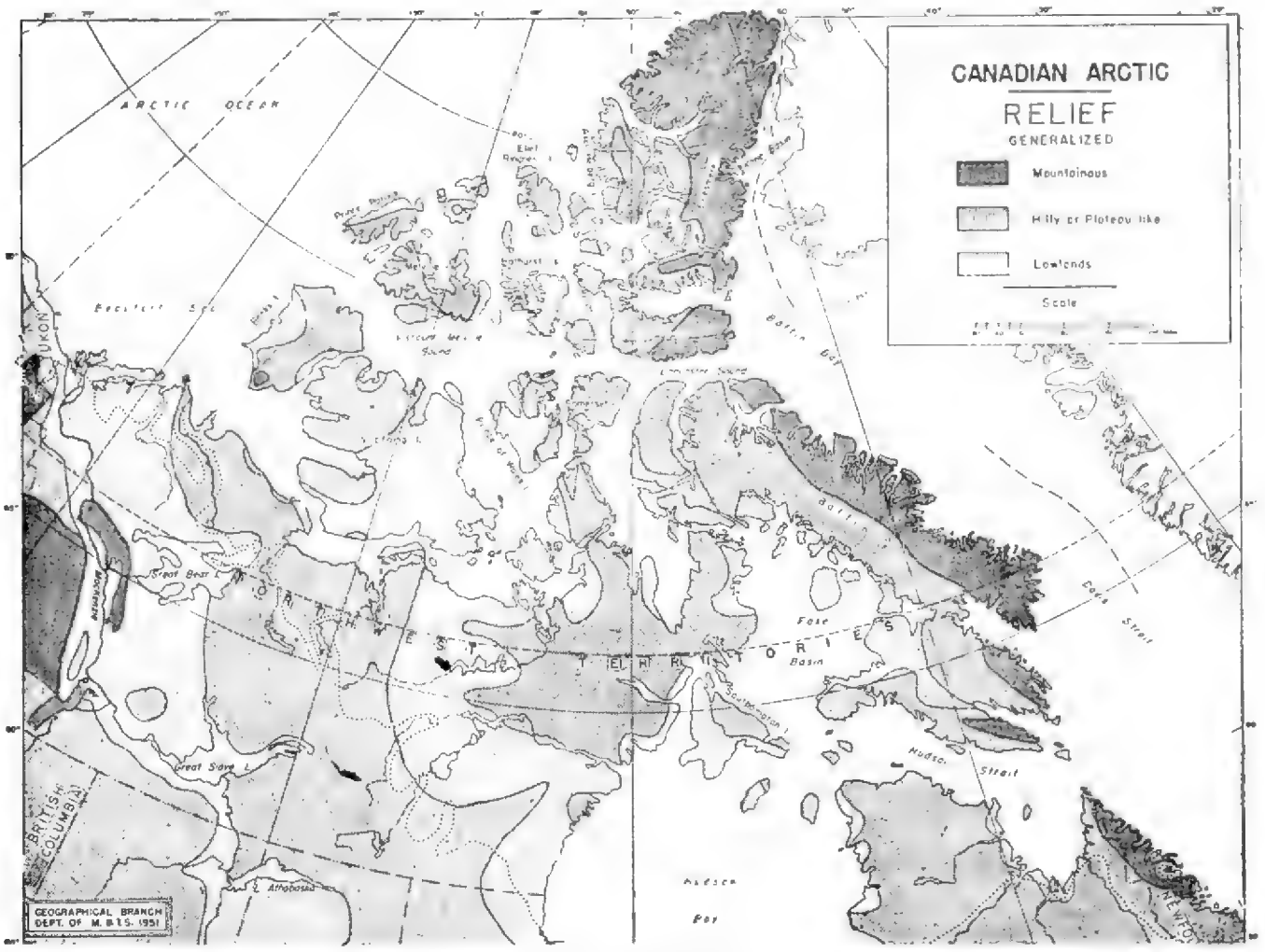

Figure 1. Generalized relief map of the Canadian Arctic Archipelago.

Lancaster Sound and its westward projection through Viscount Melville Sound and M'Clure Strait—just south of the 75th parallel—is a major topographical feature and divides the Arctic Archipelago into a well-marked northern and southern part. The southern part, by Boothia Peninsula, is divided into an eastern and a western section. In the northern half, which in recent maps is named "Queen Elizabeth Islands", Ellesmere

and Devon islands form a natural topographical and phytogeographical northern extension of the Eastern Arctic, and all the islands to the West, which comprise the Sverdrup and the Parry groups, together form a more or less natural topographical unit. Floristically the affinity of Axel Heiberg Island, together with that of western Ellesmere, is with the western islands as is that of Cornwallis Island. In his treatment of the flora of the Eastern Canadian Arctic, Polunin (1940) included all Ellesmere Island, although at the time nothing was actually known of the flora of the west coast. In the present treatment, all islands lying west of Ellesmere and Devon islands are considered part of the Western Arctic Archipelago. The principal ones and those from which some botanical information is available are Axel Heiberg, Amund and Ellef Ringnes islands, Borden, Mackenzie King, Cornwallis, Bathurst, Prince Patrick, and Melville islands. The southern islands of the Western Arctic include Banks, Victoria, Prince of Wales, and King William islands, besides numerous smaller islands adjacent to them. Boothia Peninsula, though strictly speaking not an integral part of the Archipelago, politically is counted as part of the District of Franklin and for this reason it is most practical to include its flora in the present treatment.

Islands of the Southern Group

Banks Island, covering an area of approximately 26,000 square miles (67,000 sq. km.) is the second largest of the western islands of the Arctic Archipelago. Its greatest length is about 250 miles (400 km.), measured from the north tip to Cape Lambton; its greatest width is 175 miles (280 km.), measured across the north end from Cape Prince Alfred to Russell Point. Being of fairly regular outline, its shoreline lacks deep and prominent indentations. It is separated from Victoria Island by Prince of Wales Strait and on the north is bounded by M'Clure Strait, on the west by Beaufort Sea, and on the south by Amundsen Gulf.

The southernmost part of the island forms an isolated, mountainous cape, separated from the central plateau by the broad Masik Pass that extends from De Salis Bay on the south coast to Thesiger Bay. From Nelson Head west to Cape Lambton and thence north, the coast, over a distance of about forty miles, is formed by sheer cliffs rising from the sea to heights varying from 500 to 1,500 feet (150–450 m.) (Plates I and II). The cliffs are formed of stratified, horizontal or slightly tilted Precambrian sediments and are capped by a great thickness of trap (Plate IB). Back of the cliffs the plateau is everywhere covered by a thick mantle of angular rock debris, which completely covers the underlying bedrock. The summit of the plateau reaches an elevation slightly over 2,400 feet (720 m.) and is the second highest point measured in the western islands.

North of Masik Pass, the centre of Banks Island is occupied by a plateau of rolling hills, which probably nowhere exceed an altitude of 1,000 feet (300 m.). Toward the north end of the island, the north and south trending watershed approaches to within eight miles of the east coast. More than half of this plateau is lake-covered and lacks a well-defined drainage pattern. Much of the ground is marshy and bears abundant marks of frost action, either in the form of solifluction stripes or of soil polygons (Plate V B). The northern part of the island is somewhat higher than

the central part and some distance inland may reach altitudes of about 1,500 feet (450 m.). Along most of the north coast, from Cape Prince Alfred to Russell Point, the shoreline is bold with precipitous cliffs up to 800 feet (240 m.) in height. In deep river canyons, cut to sea-level and often extending for many miles inland, are fine exposures of flat-lying, sedimentary rocks, which have been identified as being of Devonian age. Rising some distance inland to low ridges of rolling hills separated by broad river valleys, the coastal plain that forms the west side of Banks Island is for the most part low and poorly drained. Flat or gently sloping ground is generally marshy and covered by tundra vegetation, which in relative luxuriance approaches that of the mainland to the south. In terms of abundance of plant cover, this and the southern part of the island are probably the richest in the Arctic Archipelago.

Sites of ancient dwellings along the southern and southwestern shores show that the island formerly was inhabited by Eskimo (Manning, 1953); at present there are no permanent settlements, but in years when white foxes are abundant, Eskimo from the Mackenzie Delta winter at Sachs Harbour south of Cape Kellett.

Exposures of fossil ice in the form of large lenses or cores were noted in slumping banks along the west coast, where many of the low and rounded hills contain large cores of fossil ice. The formation appears to be similar to that occurring along the coastal plain of Alaska, Yukon, and Mackenzie, and suggests that this part of the island was not glaciated.

Victoria Island, with an approximate area of 79,000 square miles (204,000 sq. km.), is the largest of the western islands, and in the Arctic Archipelago is only second in size to Baffin and Ellesmere islands. Its main axis is from northwest to southeast, where the distance from the headland north of Dean Dundas Bay to the tip of Collinson Peninsula is roughly 450 miles (725 km.) long, whereas the north-south axis is only 75 miles (200 km.) less. The island is bounded on the east by M'Clintock Channel and Victoria Strait; on the north by Viscount Melville Sound and M'Clure Strait; on the west it is separated from Banks Island by the narrow Prince of Wales Strait, and from the mainland to the south by Amundsen Gulf, which, eastward through Dolphin and Union Strait, opens into Coronation Gulf, which, again, through Dease Strait, is connected to Queen Maud Gulf. The shoreline is irregular with several large and small indentations, the largest being the 130-mile(220 km.)-long Prince Albert Sound, the somewhat shorter Minto Inlet—both on the west coast—Richard Collinson Inlet and Hadley Bay on the north coast, and Albert Edward Bay on the east coast.

The eastern half of the island is of general low relief and forms a level, swampy, lake-dotted plain rising from a low and shelving coast to elevations rarely exceeding 300 feet (90 m.) above sea-level. Near Cambridge Bay on the southwest coast, the isolated Mount Pelly, with its elevation of 675 feet (203 m.), is one of the few prominent landmarks in this part of the Archipelago (Plate X, top). Except for Precambrian rocks outcropping in the Wellington Bay region and also near Richardson Island, most of this part of the island is covered by a thin mantle of glacial drift or by marine sediments, through which flat-lying Palaeozoic rocks outcrop here and there

in the steep and precipitous banks of some of the lakes and rivers. Numerous large and small lakes occur in this part of the island through which the feebly developed drainage system can only be followed with difficulty. Eskers and drumlinoid hills of glacial origin are common features of this landscape (Plate IX B).

Wollaston Peninsula and that part of the island lying north and west of a line running from the north shore of Prince Albert Sound to Hadley Bay are rugged and in marked contrast to the eastern and southern parts of the island. In Wollaston Peninsula the Colville Mountains rise to elevations of 1,700 feet (510 m.), and in the vicinity of Minto Inlet rugged hills, trending east-west between deep and narrow valleys, may exceed elevations of 2,000 feet (600 m.). The drainage pattern there is well-defined and lakes are few. Precambrian rocks are predominant, except in the northwestern part facing Prince of Wales Strait, with numerous prominent escarpments and bold headlands of dark, columnar trap rock.

The most luxuriant vegetation noted on Victoria Island is on the west coast, mainly on soils derived from weathered trap and diabase, particularly in the vicinity of Walker Bay, Minto Inlet, and Holman Island. Least productive are flat-lying formations of frost-shattered limestone or sandstone rocks, which may sometimes be almost lacking in vegetation.

Trading posts serving a small resident Eskimo population are located at Read Island, Holman Island, and Cambridge Bay; in the last-named place are a Royal Canadian Mounted Police detachment, a meteorological station, and a radio station.

Prince of Wales Island lies between Victoria and Somerset islands and is approximately 14,000 square miles (36,000 sq. km.) in area. The southern part of the island is a low, level plain rising from the low and shelving coastline in a series of elevated strandlines and strandflats. Seen from the air, this low plain appears singularly barren and devoid of plant and animal life. The surface is everywhere formed of mud polygons between low ridges of frost-shattered shale and limestone rock. Numerous lakes and ponds dot the plain. Parts of the northern portion of the island and also a range of hills along the east coast are high and rugged with a central plateau between 500 and 1,000 feet (150-300 m.) high. Near the north tip of the island and in the islands that lie across Browne Bay, some summits may reach elevations of 2,000 feet (600 m.). The island, which is uninhabited and one of the least known in the Archipelago, has only been visited a few times by air, or by explorers crossing the perpetually ice-bound seas that surround it.

King William Island, with an area of 5,000 square miles (13,000 sq. km.), is the largest of the numerous low and flat islands that dot the shallow sea between Victoria Island and Boothia Peninsula. Its shores are formed of a series of broad terraces extending back from raised strandlines. The general elevation of the interior rarely exceeds 300 feet (90 m.). The surface in most parts of the island is marshy and is dotted with numerous shallow lakes and ponds. Between the lakes the land is formed of flat-lying sedimentary rocks, covered in most places by mud polygons or by a thin mantle of frost-shattered limestone or shale rubble. A trading post is operated at Gjoa Haven near the southeast corner of the island.

Boothia Peninsula, which forms the northernmost tip of the North American Continent, from Boothia Isthmus to Bellot Strait, is 174 miles (280 km.) long; its greatest width is 126 miles (200 km.), and it covers an area of approximately 13,000 square miles (33,500 sq. km.). The backbone of the peninsula is granitic and is a northern extension of the Precambrian Shield. Along a narrow strip of the northeast coast and in a somewhat broader belt on the west coast facing James Ross Strait, the Precambrian rocks are covered by Palaeozoic sedimentary rocks.

Though strictly speaking Boothia Peninsula is not a part of the Arctic Archipelago, it has been included in the present treatment, because, politically, it is part of Franklin District. Its flora is practically unknown, and thus far only three species of vascular plants have been collected in the peninsula that are not known from other parts of the Archipelago.

Islands of the Northern Group

Axel Heiberg Island, the easternmost and largest of the islands in the Sverdrup group, is approximately 250 miles (400 km.) long and 125 miles (200 km.) wide. The entire island is mountainous with an alpine topography similar to that of northern Ellesmere Island. A chain of highly folded, rugged mountains extends through the island and is a continuation of the United States and British Empire Ranges of Northern Ellesmere Island. Axel Heiberg Island is thus part of a newly recognized orographic area that extends in two sweeping arcs from Prince Patrick Island into Northwestern Greenland (Fortier, 1954). In recent geological maps this region of folded rocks has been named the "Innuitian Region". In Axel Heiberg, part of this range is buried under a central ice-cap through which numerous peaks protrude, some estimated to be more than 7,000 feet (2,100 m.) high. The eastern and arid part of the island is not ice-covered and consists of flat-topped, mesa-like mountains of sedimentary rocks broken into blocks by deeply eroded, trench-like valleys which in comparatively recent time were invaded by the sea. Such low land as is found along the east coast and also in the interior valleys supports a sparse vegetation. This is partly due to the extremely arid climate and the infertility of the soil, and partly to winds of high velocity that in summer cause erosion and uprooting of plants, and in winter prevent the accumulation of a protecting snow cover. Nowhere in the central part, except in gullies and depressions, where some snow accumulates in winter, was closed vegetation noted. A mesa-like plateau with an elevation between 2,000 and 2,400 feet (600-720 m.) west of a seven-mile-long lake, at the head of Mokka Fiord, receives more precipitation owing to the proximity of the ice-cap and, accordingly, exhibits a surprisingly luxuriant plant growth, the like of which was not seen at lower elevations.

Sites of ancient Eskimo dwellings along the east coast show that Eskimo once lived north beyond the 80th parallel when ice conditions and climate must have been more favourable than at present; an Eskimo culture based on marine life could not exist there now.

The Ringnes Islands[1] have a complex topography owing to warping and later erosion of the sedimentary strata. Ellef Ringnes Island has at least four, large, dome-like features in its interior. Concentric, inward-facing escarpments are being eroded by streams that have breached the ridges in places. In other areas, outward-facing escarpments are noticeable. Several rivers that empty into the south-central coast meander in braided channels through flat-bottomed valleys that have perpendicular, rocky walls. Isachsen Peninsula, to the northwest, is a low plateau, greatly dissected by many streams, and in appearance is very similar to Prince Patrick Island. A meteorological station, established in 1948 on the west coast of Isachsen Peninsula, has been in continuous operation since that time.

The southern half of Amund Ringnes Island is low and has numerous streams flowing across gently sloping surfaces from the central interior. The northern part of the island has curving escarpments that are similar to those found on nearby Ellef Ringnes Island. Like most of the far northern arctic islands, there are actually no lakes on the Ringnes group. As the islands are ice-bound for most, and perhaps all, of the year, no ships have ever penetrated to their shores. Prior to 1947, only a few white men had ever seen the coasts, and no one has visited the interiors. There is as yet no record of Eskimo camps on these very inaccessible islands.

Borden Island is low on the west and north with gently rolling slopes drained by many dendritic streams. Shallow water and many small offshore islands fringe the north coast. The east coast has several lagoon lakes, the only ones on the island, cut off from the sea by narrow sand bars. The southwestern part of the island is rough and hilly, and is separated from the rest of the island by a northeast-trending narrow river valley.

Mackenzie King Island has a rocky core of dissected hills and small canyons from which streams radiate outward to the low-shelving coasts. The north coastal plain has a distinctive, small, turret-shaped hill that stands out above the sloping well-drained plain. Nearby Brock Island has, on the southeastern side, a rough dissected upland, built of dark-coloured rocks similar in appearance to those of Prince Patrick Island and southeastern Borden Island. The west coast is low, with drainage similar to western Borden Island, and is fronted on the Arctic Ocean by high, gravelly, ice-shove ridges. The Stefansson party, which discovered the Borden group of islands in 1915–16, is the only expedition to have set foot on this land.

Prince Patrick Island is an eroded upland of sedimentary rock, generally under 500 feet (150 m.) in altitude, in which structurally controlled features are apparent. The remnant areas of the level barren upland have scalloped edges where steep-sided ravines are being eroded by the many streams. The amount of active erosion that is possible upon the bare frost-riven rock is illustrated by the deltas that fill most river mouths. Such erosion takes place chiefly while the snows are melting in June and early July and while the small streams are running in August. A meteorological station was established in 1948 at Mould Bay on the east coast and has been in continuous operation.

[1] Most of the topographical data on Ringnes, Borden, Mackenzie King, Prince Patrick, Melville, and Bathurst islands, which have not been visited by the author, are taken from "The Canadian Arctic", Canadian Geography Information Series, No. 2, Department of Mines and Technical Surveys, Geographical Branch, 1951.

Melville Island, except for a few isolated peaks rising to 3,500 feet (1,070 m.), is a sedimentary rock plateau of about 1,000 feet (300 m.) in altitude, whose level upland frost-riven fragments have been little disturbed by streams. Broad inlets with perpendicular walls form numerous peninsulas and give the island a very irregular shape. Many of the coastal mountains marked on early maps are simply the high eroded edges of the level upland. Steep-sided ravines are cutting back from the inlets in a few places, but only in one area along the central west coast has the dissection caused "mountainous" topography. Hilly country that is lower than the plateau extends inland from Winter Harbour to Liddon Gulf. A narrow, sloping lowland lies along the east coast facing Byam Martin Channel, and another fronts the plateau south and west of Hecla and Griper Bay. A broad lowland occupies the southern part of Sabine Peninsula. That many emerged beaches are now found far from the shore on these lowlands indicates a rise in the level of the land. Notable features are the distinctive, circular, inward-facing escarpments of northwestern Sabine Peninsula, the elongated dome southwest of Hecla and Griper Bay, and the west-facing escarpment near Weatherall Bay on the northwest coast.

Bathurst Island is rolling to hilly, with some areas of sloping coastal plains. It is highest on the east coast, with a rolling interior plateau crossed by mature stream valleys. The lakes in the south-central part are some of the few found in the northern Arctic Islands. The southwest coast slopes down gently to the sea and is characterized by gravelly ridges marking emerged beaches.

Although a few landings have been made along the south coast, practically nothing is known of the flora or fauna of the island.

Cornwallis Island is similar to Bathurst Island in that it is rolling to hilly. It slopes up from the sea along the south coast in terraces of barren disintegrated rock. The higher land on the east coast slopes through the rolling well-drained interior to the west coast.

Resolute, on the south coast, is the main air base and the main supply and distribution centre serving the meteorological stations in the Canadian Arctic. An air strip and other aviation facilities are maintained there on a year-round basis. A meteorological station was established in 1947; ionospheric and seismological stations have since been added. Sites of ancient Eskimo dwellings near Resolute indicate that an Eskimo population dependent on marine animals once thrived there.

Geology[1]

Mountain ranges and highlands of acid, granitic rocks extend far north through the islands of the Eastern Arctic. Precambrian rocks also outcrop through the extensive, flat-lying Palaeozoic sedimentary shales of the southern islands of the Archipelago. Some of these outcrops are formed of sedimentary strata, with some basic dykes or volcanic rocks. South of the line of straits and sounds that extends through Lancaster Sound – Melville Sound–M'Clure Strait, clear across from Baffin Bay to Beaufort Sea, Palaeozoic carbonates form low, level plains or, less commonly,

[1]Mainly from notes kindly supplied by Dr. Y. O. Fortier of the Geological Survey of Canada.

plateaux in the southern islands. Immediately south of the line of straits, plateaux and extensive sandy strata predominate. Banks Island appears to have a more varied lithology, with rocks ranging in age from Palaeozoic to Cenozoic.

Much of Devon Island resembles northern Baffin Island, but elsewhere, north of Lancaster Sound – Melville Sound – M'Clure Strait, strata of varied lithology, ranging in age from Palaeozoic to Mesozoic, have been folded into mountainous structures, which in Ellesmere and Axel Heiberg islands reach elevations of 8,000 to 10,000 feet (2,400–3,000 m.). Limestone, sandstone, or shale of many different kinds, some of them brightly coloured, are widespread throughout this folded region, and the mountains of northernmost Ellesmere Island contain gneisses and granites. From Prince Patrick Island, the folded region extends in two successive sweeping arcs across to northwestern Greenland—a distance of over 1,400 miles (2,250 km.). Northwestward beyond this folded region, and particularly in the Sverdrup Islands, is a region of plains and low plateaux of flat-lying sandstone, shale, and limestone, mainly of Mesozoic age. Peculiar circular hills in which the strata are updomed and at the centre of which are exposed evaporites, such as anhydrite, gypsum, and selenite, occur in this region.

Lignitic, non-marine Cenozoic and Cretaceous strata are found in deposits of variable thickness throughout a large, crescentic area, which extends from southern Banks Island across the northern islands of the Archipelago to the east coast of Baffin Island. Thus far, similar deposits have not been detected in the southern and central part of the Archipelago.

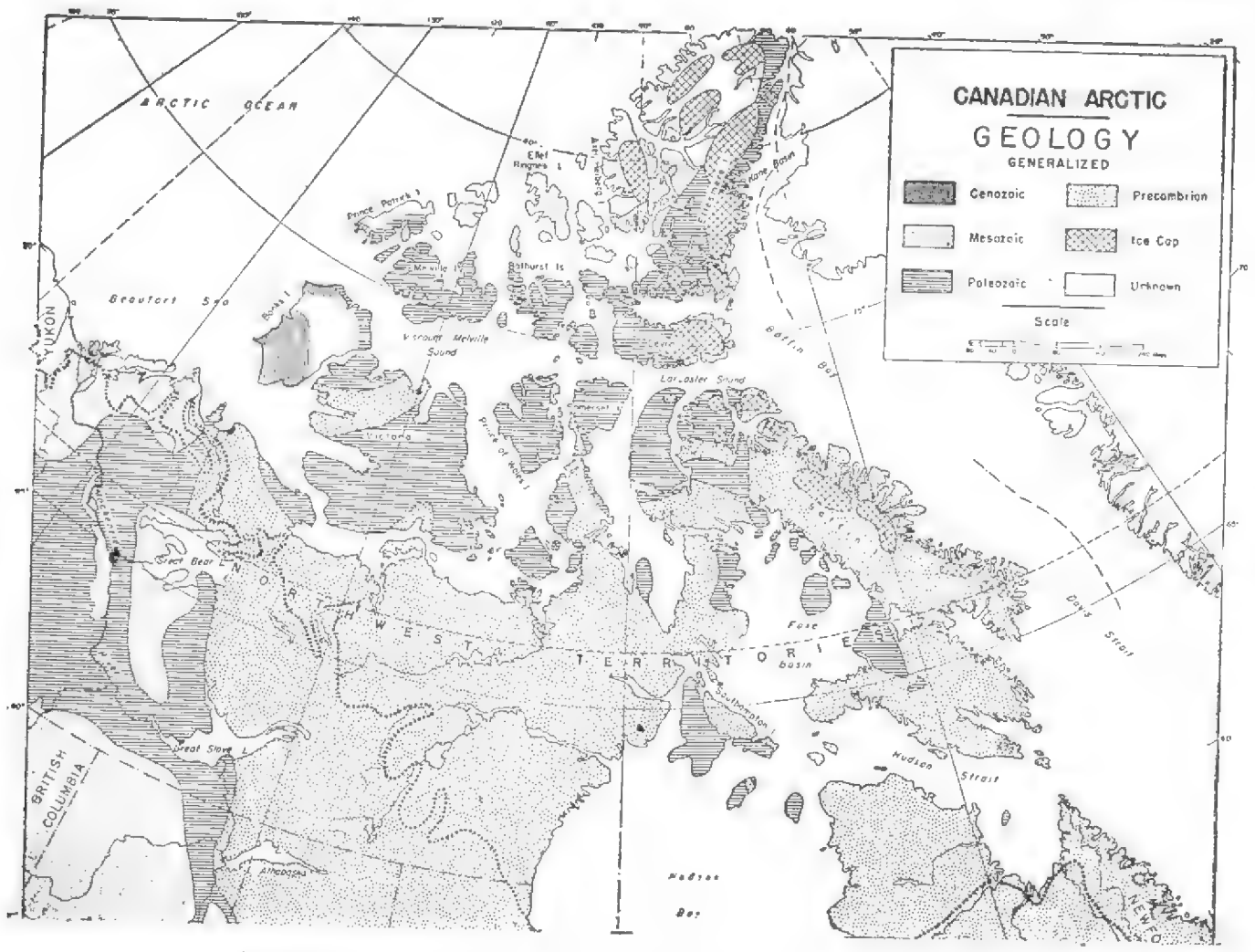

Figure 2. Geology of the Canadian Arctic Archipelago.

Glacial or marine deposits, often disturbed or displaced by present-day geomorphic processes, such as solifluction, in some parts of the Archipelago cover the consolidated bedrocks.

Geomorphic Processes Affecting Vegetation

A striking feature of the landscape in the Arctic Archipelago is the youthful appearance of most land surfaces, particularly in the lowland where unconsolidated deposits of glacial or marine origin up to the 600- to 700-foot level have emerged from the sea following the recent and rapid uplift which has taken place throughout the Canadian Arctic. Washburn (1947, pp. 74-103), who has given a detailed account of the geomorphic processes at work in Victoria Island, believes that mass-wasting is the most important levelling process and that many landscapes owe their low and moderate relief to extensive and widespread solifluction, although various forms of rock creep, rill-work, and mud-flow may be of importance in some places, and in areas of greater relief, landslides or rockfalls are in considerable evidence. Similar forms of land-wasting processes were also noted by the author in Banks Island in 1949 and probably are equally important throughout the western islands of the Archipelago. Mass-wasting probably was more active, and on a much larger scale than at present, before or soon after the emergence from the sea of the unconsolidated deposits. Landslides of the type and magnitude shown by Washburn are common in Victoria and Banks islands, but all have the appearance of being old and, before the uplift, may well have occurred below sea-level (Plate X, middle). Under the present climatic régime, non-consolidated deposits become stabilized by permafrost extending downwards to great depths, and only a comparatively thin, active surface layer is subjected to frost heaving and downhill slipping. In the Arctic, little is as yet known about the critical slope or of the rate of downhill soil creep or flow by these processes. Judged from the appearance of the vegetation affected by soil creep, the yearly rate of flow must be slight but probably varies considerably from year to year, depending upon the seasonal degree of saturation of the active surface layers. Although the various forms of land-wasting certainly in many ways affect the vegetation, the processes of movement are largely confined to late spring and early summer, and in most places entirely cease in mid-summer. Mass-wasting in the form of solifluction sheets and lobes certainly causes some very striking patterns of striped vegetation (Plates V, fig. b; VI, figs. a and b; X, top and bottom; and XI, a and b), but the processes do not greatly disturb the shallow root systems of the dwarf arctic plant.

Another geomorphic process, likewise peculiar to arctic and high-alpine regions, undoubtedly affects the vegetation more than does solifluction and downhill wastage. By this process an active layer of water-saturated, unconsolidated soil, resting on a permafrost table, by convection movements caused by repeated thawing and freezing, is churned and sorted in various manners into patterns of more or less regular stone or mud polygons, or stone circles. Although the literature is extensive (Compare Sørensen, 1935; Washburn, 1947; Hopkins and Sigafoos, 1951), no entirely satisfactory explanation has yet been advanced for the formation of

patterned ground or for the processes causing the formation of polygons, for which, in the absence of a universal term, Bryan (1946) has proposed the word "congeliturbation" (Plates V B and VI B).

Because soils in which congeliturbation is active are widespread in the Arctic Archipelago, the process is of considerable ecological importance there. Congeliturbated soils are colonized very slowly by vascular plants, and those plants that succeed in establishing themselves invariably do so first along the comparatively stable peripheral furrows or depressions that separate the individual polygons, while the more active centre long remains soft and entirely devoid of plant cover owing to the rapid rate of churning (Compare Washburn, l.c., Plates 29, fig. 1, and 30, fig. 1). In time, the plant cover gradually spreads toward the centre of the polygon and forms a protective insulating mat that eventually retards or entirely stops the freezing and thawing processes. Meanwhile there is a slow updoming over the centre of the polygon, where, in the final stage, a turf-covered hummock or tussock is formed. A section through the hummock will show the distinctly updomed centre, consisting now of a hardened but still somewhat plastic mineral core. Whereas all "niggerheads" or tussocks in arctic or alpine tundra may not be formed in this manner, the *Dryas-Kobresia* hummock tundra, so common and widespread on horizontal stony clay flats in the western islands of the Archipelago, undoubtedly is the result of a congeliturbation process that has ceased to be active.

During the final stages of the process, the furrows between the hummocks provide a habitat for other plants besides those that formed the tussocks. *Draba Bellii, Dr. lactea, Parrya arctica,* and *Salix arctica* are among the first to arrive. Lemmings use the furrows between the hummocks as runways and undoubtedly distribute seeds and other organic matter. In peak years of lemming cycles, the dung of these animals probably contributes an appreciable amount of fertilizer.

In areas of flat-lying sedimentary rocks, the consolidated bedrock is frequently covered by a mantle of frost-shattered, unsorted rubble. As bedrock or permafrost is close to the surface, the water table is high and the broken rock consequently subject to vigorous frost heaving or congeliturbation. Such flat-lying, rubble-covered formation is widespread in the Archipelago, chiefly in the Palaeozoic areas but is sometimes also found in areas of Precambrian sediments, and most often almost entirely devoid of higher plant life.

Wind erosion is active throughout the Archipelago. In exposed places all plant growth is severely curtailed or even lacking, except in the lee of protruding and sheltering obstacles. Mechanical abrasion by drifting sand particles in summer and by fine snow crystals in winter likewise has a retarding and destructive effect on plant growth.

Aeolian deposition is active, particularly in the mountainous areas of the Archipelago where the spring run-off from the ice-caps or large perennating snowfields causes the formation of large erosion fans or broad and shallow streambeds, from which high winds later in summer may pick up clay particles and fine sand. The process of loess deposition in several respects resembles the deposition of wind-transported snow crystals, the main difference being that the loess does not consolidate and, unless deposited in water or among vegetation, is picked up again by the next high wind. The loess deposition experienced by the writer in Axel Heiberg

Island during a two-day gale in August, 1953, was very impressive. The rate of deposition in places where it is retained and arrested by vegetation is appreciable and can be measured by the often considerable lengths of buried plant stems, particularly noticeable in cushion plants, such as *Potentilla Vahliana*, *Saxifraga tricuspidata*, *S. caespitosa* ssp. *uniflora*, or among tussock-forming species such as *Deschampsia brevifolia*. Throughout the Arctic such plants as *Saxifraga caespitosa*, and some others, in which the stems and calyces are glutinous, frequently become completely coated with firmly embedded fine sand grains (Plate XIX).

Climate

The amount of meteorological information from the Arctic Archipelago available to Simmons (1913) was meagre and consisted mainly of the one- to two-year-long records of expeditions that had wintered in the Arctic during the early half of the nineteenth century, and of the 1882–83 observations of two Polar Year stations. It is interesting to note, therefore, that in so far as climatic data affecting plant life is concerned, no very considerable modification of Simmons' conclusions is needed as a result of the greatly extended meteorological work and the impressive mass of data now available following the establishment of a chain of modern weather stations across the North American Arctic. In his appraisal of climate in relation to plant life in the Archipelago, Simmons thus noted that the climate varies "to a certain degree within such a vast area, but the differences are comparatively small. The most prominent and important factor I take its extreme dryness to be". On page 31 (l.c.) Simmons concluded that "the quantity of moisture available during the period of vegetation must be very small, and moreover strong winds will in many instances sweep away the snow from plains and mountainsides, which must then become too dry to sustain any vegetation at all. Large stretches of ground will assume the character of veritable desert, where only such places appear as oases, as have a richer access to water from accumulations of snow. This especially holds good about the northern parts of the Archipelago".

The following excerpts from Rae (1951) sum up our present information on the climate of the Arctic Archipelago in so far as it affects plant growth:

"During the summer, the sun is above the horizon continuously for a period corresponding to the winter dark season. However, the heating effect of the continuous insolation is lessened considerably by the obliquity of the sun's rays and the resultant thickness of the atmosphere through which they must pass to reach the ground, for the noon elevation of the sun on June 21 is only 47 degrees at the Arctic Circle and $23\frac{1}{2}$ degrees at the North Pole."

"Another factor which reduces the percentage of the solar radiation that reaches the ground in the summer is the extensive cloud cover over the Archipelago. The amount of cloud cover may be judged from the fact that in August, 1948, there were only 48 hours of sunshine recorded at Resolute [Cornwallis Island] out of a possible 662 hours. This is undoubtedly an extreme case but it serves as an illustration."

"Since the Arctic Archipelago covers an area extending over 20 degrees of latitude, one would normally expect a considerable difference in temperature to exist between the southernmost and the northernmost portions. However, a gradual decrease of temperature with increasing latitude is not appreciable in the summer months owing to the presence of large water areas."

"During the brief summer period the ice-filled polar waters with a surface temperature near 30° F. [−1·1° C.] prevent the air in contact with them from warming up to any great extent. Moreover, an incursion of warm air from the south is cooled rapidly in its lower layers by contact with the cold water. As a result, summer temperatures are uniformly cool with the average temperature of the warmest month, July, near 40° F. [4·4° C.]."

"Most of the water surfaces are frozen over in the winter. However, the newly-formed ice is usually less than six feet thick and there is sufficient radiation through the ice from the water below, at a temperature near 30° F. [−1·1° C.], to exert a slight moderating influence. Thus the winter temperatures are more severe than they would be if the seas remained open but not as low as they would be, if the ice areas were all land."

"The severe winters and cool summers of the Arctic Archipelago result in low mean annual temperatures. These are generally in the range 15° to 20° F. [−6·7° to −9·5° C.] in the Hudson Strait region with a high of 21° F. [−6·1° C.] at Resolution Island. For stations bordering on Lancaster Sound, Baffin Bay and Amundsen Gulf, the mean annual temperatures are within a few degress of 10° F. [−12·2 °C.], and at stations on the northernmost islands, these values drop below zero, with both Isachsen and Eureka reporting an annual mean of −4° F. [−20° C.] over a two-year period."

In Figures 3 and 4 are shown the course of the isotherms for the months of July and September, and on pages 20 to 27 tables show monthly and annual daily minimum, maximum, and mean temperatures, as well as average monthly and annual precipitation, for ten meteorological stations across the Arctic Archipelago (all from Rae, 1951).

Rae (l.c., p. 11) describes the progress of summer in the Arctic Archipelago as follows: "The snow begins to melt over southern Baffin Island during the first half of May, but in the islands north of the 75th parallel, little melting occurs until the beginning of June. However, once the melting process has started, the snow disappears rapidly and by the end of June the islands are snow-free except in hilly terrain and in gullies. The presence of considerable amounts of melting snow and ice maintains June temperatures near the freezing point and temperature differences through the Archipelago are virtually non-existent. The highest [June] means are reported from Eureka [latitude 80°] and Lake Harbour [latitude 62° 50′] near the northern and southern extremities of the region with 38° F. [3·3° C.] at both stations, and the lowest ones have been recorded at Mould Bay and Isachsen which both report means of 30° F. [−1·1° C.].

"Mean temperatures continue to rise gradually and uniformly throughout the region in July, and as in June, there is little difference in temperature from station to station. The lowest mean temperatures are to be found along the coasts bordering on the polar sea with both Isachsen and Mould

Bay reporting 38° F. [3·3° C.]. Resolution Island at the mouth of Hudson Strait also reports a July mean of 38° F. [3·3° C.]. The waters of Hudson Strait, now colder than the neighbouring land, reverse their winter role and retard the rise in mean temperature of stations along its coasts.

"The highest July temperatures occur on the larger islands near the mainland. For example, Lake Harbour and Pangnirtung report July means of 46° F. [7·8° C.], with 48° F. [8·9° C.] at Cambridge Bay. It is probable that mean temperatures in the interior of Victoria Island are near 50° F. [10° C.]

"Frost may, and usually does, occur in July every year. The only portion of the Archipelago which may experience a frost-free July is the southern part of Baffin Island."

A comparison between temperatures recorded in the Mackenzie Valley or Yukon and those of the Arctic Archipelago shows that the climate of the Arctic islands is a modified marine type with extreme winter temperatures not so low as they would be in a continental area at the same latitude and extreme summer temperatures not so high. Thus, according to Rae (l.c., p. 13) "The highest temperature that has been recorded at Dawson [in central Yukon] and Fort Good Hope [on the lower Mackenzie] is 95° F. [35° C.], and 103° F. [39·4° C.] at Fort Smith [in latitude 60°]. Even at stations on the Arctic coast such as Aklavik [in the delta of the Mackenzie] and Coppermine [in Coronation Gulf], absolute maxima as high as 93° F. and 87° F. [34° and 30·6° C.] respectively, have been reached. For stations at comparable latitudes in the Archipelago, the highest temperatures that have been experienced are about 20 degrees [11 centigrades] lower, with Pangnirtung reporting 70° F. [21° C.], Nottingham Island 73° F. [22·8° C.], Lake Harbour 80° F. [26·7° C.], and Resolution Island 61° F. [16·1° C.]. These stations are all located at the extreme southern end of the Archipelago. If we consider more northerly stations, the absolute maximum temperatures are much lower, with Eureka reporting 66° F. [18·9° C.], Isachsen 64° F. [17·8° C.], Mould Bay 57° F. [13·8° C.] and Resolute 59° F. [15·0° C.]. During its first summer of operation, the station at Alert near the north tip of Ellesmere Island recorded a temperature as high as 64° F. [17·8° C.]."

An examination of the average values of the annual extreme high temperatures discloses that the variation between stations in the Archipelago is remarkably small with every station reporting a value within a few degrees of 60° F. [15·6° C.]. On the other hand, the occurrences of extreme high temperatures between 70° and 80° F. [21·0° to 26·6° C.] are very rare and are experienced only at stations located on one of the larger islands near the mainland.

Rae (l.c., p. 13) notes the greatly moderating effect of a body of water as narrow as Coronation Gulf, for the extreme high temperature that has been recorded at Cambridge Bay is 76° F. (24·4° C.), or 11 degrees (6·2 centigrades) lower than that on the mainland at Coppermine, on the opposite shore of the gulf. Stefansson (1944), when crossing Dolphin and Union Strait in the spring of 1911, noted "that the season was about a month farther advanced on the mainland near Point Tinney than at the Victoria Island coast sixty miles northeast".

According to Rae (l.c., p. 14) "The lowest officially recorded temperature in North America, −81·4° F. [−63° C.], occurred at Snag Airport in [southwestern] Yukon on February 3, 1947. In comparison, the lowest temperature recorded at a meteorological station in the Archipelago is −63° F. [−52·9° C.] which has occurred at Eureka, Fort Conger, and Mould Bay. At most stations in the islands a temperature as low as −60° F. [−51·0° C.] will occur but rarely."

With the exception of southern Baffin Island, all parts of the Arctic Archipelago are north of the Arctic Circle, and the sun, accordingly, is continuously above the horizon in mid-summer for a period ranging from one day at the Arctic Circle to 149 days in the latitude of the northernmost tip of Ellesmere Island, and below the horizon for a corresponding length of time in winter. While the sun is below the horizon, there is no diurnal variation in temperature as known in more southern latitudes; changes in temperature during this period are due mainly to air disturbances. Rae (l.c., p. 14) notes that "In winter, radiational cooling of the surface serves to cool the lowest air layers. Thus the normal winter thermal structure of the air in the Arctic in a vertical section consists of a strong temperature inversion aloft. Any turbulent mixing of the air will tend to destroy the inversion and the resultant re-distribution of heat will cause a cooling at the inversion level and a warming at the surface. Consequently an increase in wind speed in winter is almost invariably accompanied by a temperature rise regardless of the direction of the wind."

From a standpoint of total annual precipitation, Rae (l.c., pp. 16–17) confirms Simmons' conclusion that the Arctic Archipelago is one of the driest regions in the world. The annual precipitation of the islands north of the Parry Group averages less than five inches [127 mm.] per year, with Eureka reporting a total of only 1·74 inches [44·2 mm.] per year over a two-year period. Southward from the Parry Islands there is an increase in the annual precipitation with decreasing latitude, with annual totals ranging from 5 to 10 inches [127 to 254 mm.] between the 75th parallel and the Arctic Circle, while most of the stations in southern Baffin Island and the Hudson Strait area report mean annual totals in the range from 10 to 15 inches [254 to 481 mm.], with the lower values at the western end of the strait and the higher ones at the eastern end.

"Snow may fall during any month of the year in the Archipelago, whereas rain is limited to the relatively short summer period. Nevertheless, the proportion of the total annual precipitation which falls as rain is surprisingly large and in the islands north of the Parry Group may amount to 50 per cent while south of the Parry Group the ratio is from 40 to 50 per cent. In other words, over a large part of the Archipelago summer rainfall accounts for nearly one-half of the annual precipitation."

The small amount of winter precipitation and the tendency of the snow to drift and accumulate in the lee of obstacles and depressions and ravines have been commented upon by nearly every expedition that has wintered in the Arctic. Because of their small size, the snow crystals are readily blown about by the wind with the result that hilltops and level ground are generally bare all winter.

In some parts of the Arctic, especially in the close proximity of open water or partly ice-covered sea, rime and hoar frost may add considerably

to the amount of precipitation. Throughout the Arctic, in extreme cold weather, moisture in the air may condense in the form of tiny ice crystals, which fall as light snow from a perfectly clear sky. Rae (l.c.) notes that despite "their small size these snow crystals occasionally fall at a sufficiently rapid rate to cause a deposit of one-tenth of an inch [2·54 mm.] in six hours."

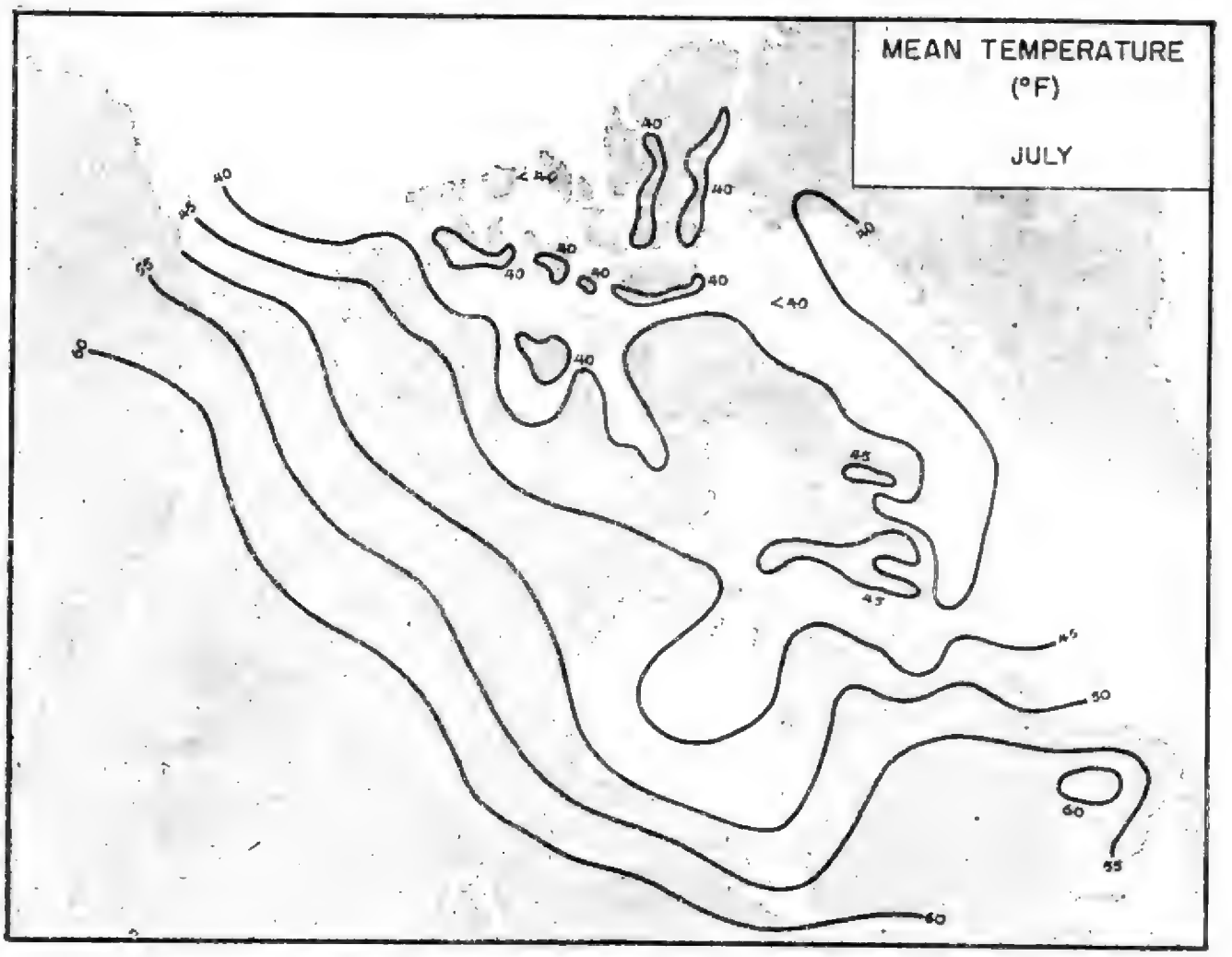

Figure 3. Mean temperatures (°F.) July.

According to Rae (p. 18), nowhere in the Archipelago is there a great deal of variation in the mean monthly snowfall as recorded at any one station from December to April. "The mean monthly snowfall is about one to two inches [25·4 to 50·8 mm.] for the islands north of the Parry Group, with occasional months with less than one inch recorded. For most of the Archipelago south of the Parry Islands the mean monthly winter snowfall is about two to four inches [50·8 to 101·6 mm.] except in southern Baffin Island and the Hudson Strait area where it amounts to five to ten inches.

"July and August generally have less snowfall than any other months and any snow which does fall usually melts in a short time. However, for stations in the northern half of the Archipelago where the amount of winter snowfall is slight, more snow may fall in August than in some of the winter months.

"Most of the terrain in the western Arctic is snow-free during July and August except in ravines and gullies. However, permanent snowfields are found in the mountain ranges which extend across Baffin, Devon,

Ellesmere and Axel Heiberg Islands." At the end of the unusually cold summer of 1949, the writer noted in Banks and Victoria islands large snowfields in ravines and in the lee of cliffs and ridges.

The extensive cloud cover, which throughout the Archipelago during the months of June, July, and August averages from 70 to 80 per cent, greatly reduces solar radiation during the season of plant growth.

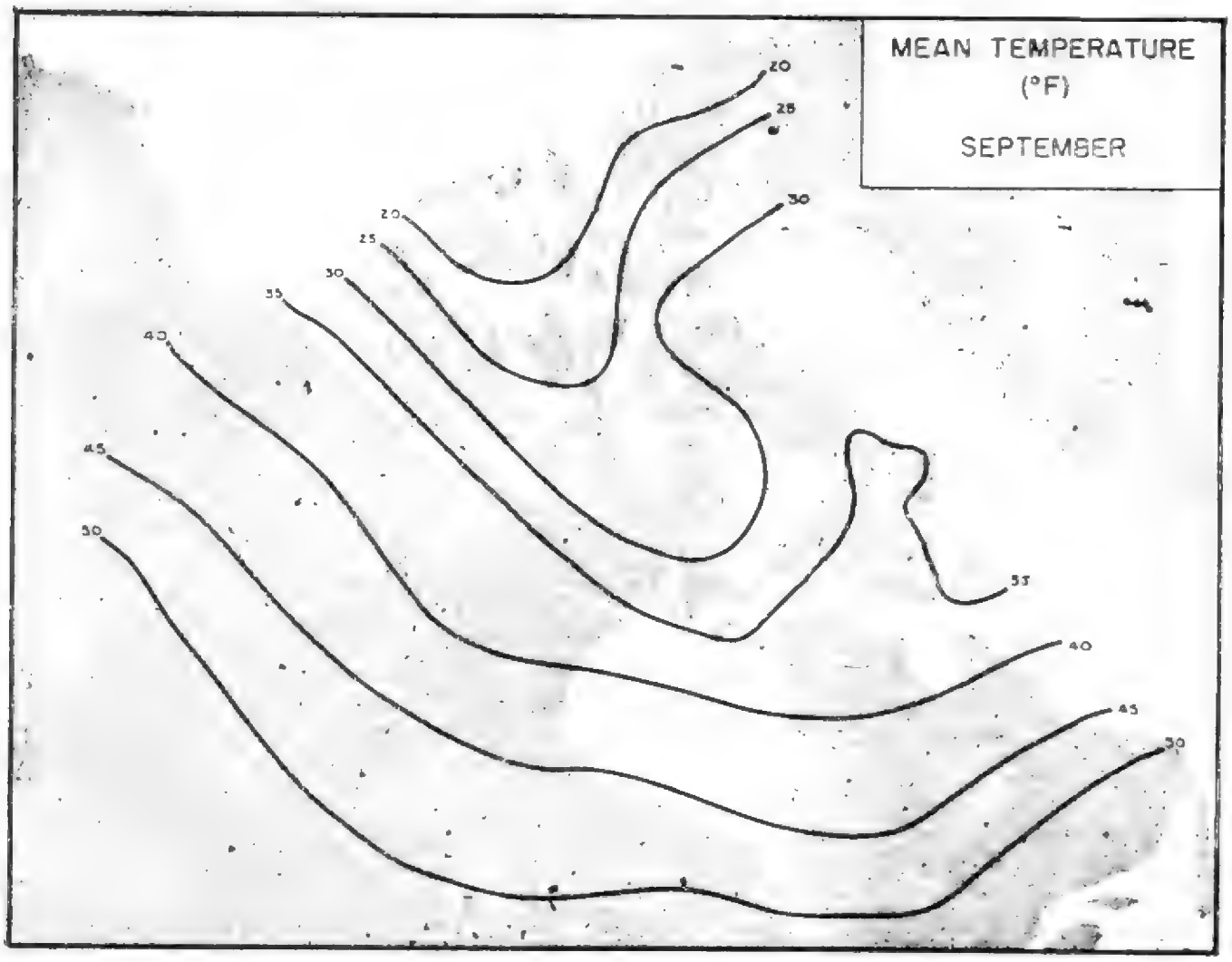

Figure 4. Mean temperatures (°F.) September.

Table I.—List of Stations

Station	Latitude (°N.)	Longitude (°W.)	Elevation (ft.)	Years of Record
Holman Island	70° 30′	117° 38′	30	1940–1950
Cambridge Bay	69° 07′	105° 01′	45	1940–1950
Fort Ross	71° 55′	94° 15′	50	1938–1950
Clyde River	70° 25′	68° 17′	26	1943–1950
Mould Bay	76° 16′	119° 50′	50	1948–1950
Resolute	74° 41′	94° 54′	56	1947–1950
Pond Inlet	72° 43′	78° 30′	13	1923–1926
Isachsen	78° 47′	103° 32′	83	1948–1950
Eureka	80° 00′	85° 56′	8	1947–1950
Craig Harbour	76° 12′	79° 35′	12	1933–1940

Table II.—Monthly and Annual Averages of Daily Mean Temperatures

—	Holman Island	Cambridge Bay	Fort Ross	Clyde River	Mould Bay	Resolute	Pond Inlet	Isachsen	Eureka	Craig Harbour
January	−17 F −27·2 C	−26 F −32·2 C	−20 F −28·8 C	−16 F −26·6 C	−32 F −35·5 C	−30 F −34·4 C	−25 F −31·6 C	−37 F −38·3 C	−38 F −38·8 C	−21 F −29·4 C
February	−22 F −30 C	−28 F −33·3 C	−25 F −31·6 C	−19 F −28·3 C	−31 F −35 C	−34 F −36·6 C	−28 F −33·3 C	−33 F −36·1 C	−39 F −39·4 C	−23 F −30·5 C
March	−12 F −24·4 C	−18 F −27·7 C	−14 F −25·5 C	−13 F −25 C	−21 F −29·4 C	−23 F −30·5 C	−21 F −29·4 C	−26 F −32·2 C	−30 F −34·4 C	−14 F −25·5 C
April	0 F −17·7 C	−8 F −22·2 C	−7 F −21·6 C	−2 F −18·8 C	−11 F −23·8 C	−13 F −25 C	−3 F −19·4 C	−20 F −28·8 C	−21 F −29·4 C	−2 F −18·8 C
May	22 F −5·5 C	16 F −8·8 C	15 F −9·4 C	19 F −7·2 C	12 F −11·1 C	13 F −10·5 C	19 F −7·2 C	10 F −12·2 C	13 F −10·5 C	17 F −8·3 C
June	38 F 3·3 C	35 F 1·6 C	32 F 0 C	34 F 1·1 C	30 F −1·1 C	33 F 0·5 C	35 F 1·6 C	30 F −1·1 C	38 F 3·3 C	34 F 1·1 C
July	46 F 7·7 C	48 F 8·8 C	40 F 4·4 C	41 F 5 C	38 F 3·3 C	40 F 4·4 C	42 F 5·5 C	38 F 3·3 C	42 F 5·5 C	41 F 5 C
August	43 F 6·1 C	45 F 7·2 C	36 F 2·2 C	40 F 4·4 C	34 F 1·1 C	38 F 3·3 C	41 F 5 C	33 F 0·5 C	38 F 3·3 C	38 F 3·3 C
September	32 F 0 C	31 F −0·5 C	25 F −3·8 C	32 F 0 C	19 F −7·2 C	23 F −5 C	31 F −0·5 C	16 F −8·8 C	19 F −7·2 C	28 F −2·2 C
October	18 F −7·7 C	12 F −11·1 C	10 F −12·2 C	21 F −6·1 C	−2 F −18·8 C	6 F −14·4 C	15 F −9·4 C	−5 F −20·5 C	−6 F −21·1 C	12 F −11·1 C

November.....	−1 F −18·3 C	−10 F −23·3 C	−7 F −21·6 C	4 F −15·5 C	−16 F −26·6 C	−8 F −22·2 C	−4 F −20 C	−22 F −30 C	−21 F −29·4 C	−5 F −20·5 C
December.....	−12 F −24·4 C	−22 F −30 C	−15 F −26·1 C	−11 F −23·8 C	−26 F −32·2 C	−19 F −28·3 C	−20 F −28·8 C	−31 F −35 C	−36 F −37·7 C	−18 F −27·7 C
Year.....	11 F −11·6 C	6 F −14·4 C	6 F −14·4 C	11 F −11·6 C	−1 F −18·3 C	2 F −16·6 C	7 F −13·8 C	−4 F −20 C	−4 F −20 C	7 F −13·8 C
Range.....	68 F 37·8 C	76 F 42 C	65 F 36·1 C	60 F 33·2 C	70 F 38·9 C	74 F 41·1 C	70 F 38·9 C	75 F 41·6 C	81 F 45 C	64 F 35·7 C

Table III.—Monthly and Annual Averages of Daily Minimum Temperatures

—	Holman Island	Cambridge Bay	Fort Ross	Clyde River	Mould Bay	Resolute	Pond Inlet	Isachsen	Eureka	Craig Harbour
January	−23 F −30·5 C	−33 F −36·1 C	−27 F −32·7 C	−23 F −30·5 C	−41 F −40·5 C	−36 F −37·7 C	−32 F −35·5 C	−43 F −41·6 C	−46 F −43·3 C	−30 F −34·4 C
February	−30 F −34·4 C	−35 F −37·2 C	−32 F −35·5 C	−26 F −32·2 C	−39 F −39·4 C	−41 F −40·5 C	−35 F −37·2 C	−40 F −40 C	−46 F −43·3 C	−30 F −34·4 C
March	−20 F −28·8 C	−26 F −32·2 C	−22 F −30 C	−22 F −30 C	−29 F −33·8 C	−31 F −35 C	−29 F −33·8 C	−32 F −35·5 C	−38 F −38·8 C	−23 F −30·5 C
April	−6 F −21·1 C	−18 F −27·7 C	−14 F −25·5 C	−10 F −23·3 C	−20 F −28·8 C	−21 F −29·4 C	−12 F −24·4 C	−28 F −33·3 C	−29 F −33·8 C	−12 F −24·4 C
May	16 F −8·8 C	9 F −12·7 C	8 F −13·3 C	12 F −11·1 C	5 F −15 C	6 F −14·4 C	12 F −11·1 C	4 F −15·5 C	7 F −13·8 C	8 F −13·3 C
June	32 F 0 C	30 F −1·1 C	27 F −2·7 C	28 F −2·2 C	24 F −4·4 C	29 F −1·6 C	30 F −1·1 C	26 F −3·3 C	33 F 0·5 C	28 F −2·2 C
July	38 F 3·3 C	41 F 5 C	34 F 1·1 C	33 F 0·5 C	33 F 0·5 C	35 F 1·6 C	36 F 2·2 C	34 F 1·1 C	37 F 2·7 C	35 F 1·6 C
August	37 F 2·7 C	40 F 4·4 C	32 F 0 C	33 F 0·5 C	29 F −1·6 C	33 F 0·5 C	36 F 2·2 C	29 F −1·6 C	34 F 1·1 C	34 F 1·1 C
September	28 F −2·2 C	28 F −2·2 C	21 F −6·1 C	28 F −2·2 C	14 F −10 C	19 F −7·2 C	27 F −2·7 C	10 F −12·2 C	14 F −10 C	25 F −3·8 C
October	13 F −10·5 C	6 F −14·4 C	4 F −15·5 C	15 F −9·4 C	−8 F −22·2 C	0 F −17·7 C	10 F −12·2 C	−11 F −23·8 C	−13 F −25 C	8 F −13·3 C

November	−7 F −21·6 C	−17 F −27·2 C	−13 F −25 C	−2 F −18·8 C	−22 F −30 C	−14 F −25·5 C	−10 F −23·3 C	−26 F −32·2 C	−27 F −32·7 C	−10 F −23·3 C
December	−17 F −27·2 C	−28 F −33·3 C	−22 F −30 C	−18 F −27·7 C	−33 F −36·1 C	−26 F −32·2 C	−27 F −32·7 C	−35 F −37·2 C	−41 F −40·5 C	−24 F −31·1 C
Year	5 F −15 C	0 F −17·7 C	0 F −17·7 C	4 F −15·5 C	−7 F −21·6 C	−4 F −20 C	0 F −17·7 C	−9 F −22·7 C	−10 F −23·3 C	1 F −17·2 C
Range	68 F 37·8 C	76 F 42·2 C	66 F 36·6 C	59 F 32·7 C	74 F 41·1 C	76 F 42·2 C	71 F 39·4 C	77 F 42·7 C	83 F 46·1 C	65 F 36·1 C

Table IV.—Monthly and Annual Averages of Daily Maximum Temperatures

—	Holman Island	Cambridge Bay	Fort Ross	Clyde River	Mould Bay	Resolute	Pond Inlet	Isachsen	Eureka	Craig Harbour
January	−11 F −23·8 C	−18 F −27·7 C	−13 F −25 C	−10 F −23·3 C	−20 F −28·8 C	−23 F −30·5 C	−18 F −27·7 C	−31 F −35 C	−31 F −35 C	−13 F −25 C
February	−14 F −25·5 C	−22 F −30 C	−18 F −27·7 C	−12 F −24·4 C	−22 F −30 C	−27 F −32·7 C	−22 F −30 C	−27 F −32·7 C	−33 F −36·1 C	−16 F −26·6 C
March	−6 F −21·1 C	−12 F −24·4 C	−7 F −21·6 C	−5 F −20·5 C	−13 F −25 C	−16 F −26·6 C	−23 F −30·5 C	−19 F −28·3 C	−22 F −30 C	−6 F −21·1 C
April	7 F −13·8 C	2 F −16·6 C	0 F −17·7 C	5 F −15 C	−1 F −18·3 C	−4 F −20 C	6 F −14·4 C	−12 F −24·4 C	−12 F −24·4 C	8 F −13·3 C
May	27 F −2·7 C	22 F −5·5 C	22 F −5·5 C	27 F −2·7 C	18 F −7·7 C	20 F −6·6 C	27 F −2·7 C	17 F −8·3 C	20 F −6·6 C	25 F −3·8 C
June	44 F 6·6 C	40 F 4·4 C	37 F 2·7 C	40 F 4·4 C	34 F 1·1 C	37 F 2·7 C	41 F 5 C	36 F 2·2 C	42 F 5·5 C	39 F 3·8 C
July	52 F 11·1 C	54 F 12·2 C	46 F 7·7 C	48 F 8·8 C	43 F 6·1 C	46 F 7·7 C	48 F 8·8 C	42 F 5·5 C	48 F 8·8 C	48 F 8·8 C
August	48 F 8·8 C	50 F 10 C	41 F 5 C	46 F 7·7 C	39 F 3·8 C	42 F 5·5 C	46 F 7·7 C	38 F 3·3 C	42 F 5·5 C	42 F 5·5 C
September	36 F 2·2 C	34 F 1·1 C	29 F −1·6 C	36 F 2·2 C	24 F −4·4 C	27 F −2·7 C	34 F 1·1 C	21 F −6·1 C	24 F −4·4 C	32 F 0 C
October	22 F −5·5 C	19 F −7·2 C	15 F −9·4 C	27 F −2·7 C	4 F −15·5 C	12 F −11·1 C	20 F −6·6 C	2 F −16·6 C	0 F −17·7 C	16 F −8·8 C

November	4 F −15·5 C	−3 F −19·4 C	−1 F −18·3 C	11 F −11·6 C	−8 F −22·2 C	−1 F −18·3 C	1 F −17·2 C	−11 F −23·8 C	−15 F −26·1 C	0 F −17·7 C
December	−6 F −21·1 C	−15 F −26·1 C	−9 F −22·7 C	−5 F −20·5 C	−23 F −30·5 C	−14 F −25·5 C	−14 F −25·5 C	−26 F −32·2 C	−31 F −35 C	−12 F −24·4 C
Year	17 F −8·3 C	13 F −10·5 C	12 F −11·1 C	17 F −8·3 C	6 F −14·4 C	8 F −13·3 C	13 F −10·5 C	2 F −16·6 C	3 F −16·1 C	14 F −10 C
Range	66 F 36·6 C	76 F 42·2 C	64 F 35·5 C	60 F 33·3 C	65 F 36·1 C	73 F 40·5 C	70 F 38·8 C	73 F 40·5 C	81 F 45 C	64 F 35·5 C

Table V.—Average Monthly and Annual Precipitation

(Rainfall plus snowfall converted to inches and millimetres of rain)

—		Holman Island	Cambridge Bay	Fort Ross	Clyde River	Mould Bay	Resolute	Pond Inlet	Isachsen	Eureka	Craig Harbour
January	in.	·23	·28	·67	·35	·04	·07	·21	·07	·10	·72
	mm.	6	7	17	9	1	2	5	2	3	18
February	in.	·35	·18	·30	·33	·05	·14	·18	·06	·06	·32
	mm.	9	5	8	·8	1	4	5	2	2	8
March	in.	·39	·22	·39	·24	·12	·20	·19	·06	·10	·46
	mm.	10	6	10	6	3	5	5	2	3	12
April	in.	·33	·14	·33	·24	·02	·13	·29	·05	·01	·71
	mm.	8	4	8	6	1	3	7	1	.....	18
May	in.	·43	·26	·45	·44	·15	·62	·19	·32	·02	·62
	mm.	11	7	11	11	4	16	5	8	1	16
June	in.	·34	·24	1·01	·37	·28	·68	·60	·14	·02	·62
	mm.	9	6	26	9	7	17	15	4	1	16
July	in.	·67	1·12	·86	·94	·96	1·24	1·22	·73	·30	·67
	mm.	17	28	22	24	24	31	31	19	8	17
August	in.	1·45	·87	1·44	1·17	·34	·95	1·19	·49	·02	2·20
	mm.	37	22	37	30	9	24	30	12	1	56
September	in.	·85	·72	1·38	·86	·49	1·12	·95	·64	·59	·72
	mm.	22	18	35	22	12	28	24	16	15	18

October....	in.	·75	·69	1·23	1·29	·08	·57	·72	·14	·11	1·72
	mm.	19	18	31	33	2	14	18	4	3	44
November .	in.	·35	·52	·90	1·13	·08	·27	·44	·20	·14	·70
	mm.	9	13	23	29	2	7	11	5	4	18
December..	in.	·22	·30	·32	·21	·03	·10	·30	·05	·07	·28
	mm.	6	8	8	5	1	3	8	1	2	7
Year.....	in.	6·36	5·54	11·42	7·57	2·64	6·10	6·48	2·95	1·74	9·74
	mm.	162	141	290	192	67	155	165	75	44	247

Glaciation and History of the Flora

In considering the history of the contemporary flora of the Arctic Archipelago, account must be taken of the climate that prevailed there during the Pleistocene and post-Pleistocene period of emergence, when many of the islands rose above the sea and attained their present configuration.

Although the position and extent of existing ice-caps are now fairly accurately mapped, we know as yet comparatively little about the former extent of ice-caps or of earlier glaciation in the northern parts of the Archipelago.

Simmons (1913), in his chapter on "The history of the flora of the Arctic American Archipelago", has summed up the evidence for and against total, partial, or absence of glaciation. He himself believed that in the absence of conclusive proof of a total glaciation, the climate during the Pleistocene had been too arid for an extensive glaciation to develop. His reasoning seems convincing and has been accepted by many subsequent writers, including Fernald (1925), Hultén (1937), and others. But although Simmons thought most of the Arctic Archipelago unglaciated, he did not think it had been a refuge for arctic plants during the Pleistocene, because it, or such parts as had been above the sea, had been too cold and arid even for arctic plants. In Simmons' opinion, one of the strongest arguments in favour of this contention was the alleged "absence [in the flora of the Archipelago] of even a single peculiar type or endemic species". This view is hardly tenable in the light of our present knowledge of the flora of the Archipelago and its affinities, and it has received no support from Fernald (l.c.) or Hultén (l.c.), who have both assembled strong phytogeographic support for the view that the Archipelago was an important refugium for arctic plants during the Pleistocene. As we shall see later, the writer's conclusions strongly support the latter view.

Washburn (l.c.) has reviewed the findings of earlier workers, which, together with the results of his own studies in the field, conclusively prove that southern Victoria Island was once glaciated. He thinks that this was the case also with most, if not all, of the southern islands. As regards the northern parts of the Archipelago, however, he concludes his discussion of the evidence for and against glaciation in the cautious and non-committal note that "These widely divergent views reflect our lack of facts regarding the area".

While the presence of glacial deposits and striae can generally be accepted as proof of glaciation, the absence of glacial markings and depositions cannot be taken as proof of absence of glaciation. In other words, in an area of fairly general glaciation, it is very difficult to prove conclusively that certain areas were not glaciated. Nor is there yet proof that the glaciation, of which there is abundant proof in the southern islands in the form of glacial till, eskers, drumlins, moraines, and striae, was necessarily contemporary with that of the mainland to the south.

The discovery, at levels above the maximum submergence, in Wollaston Peninsula and elsewhere in southern Victoria Island, of large pingos similar to those reported by Porsild (1938) from the unglaciated coastal plain of northwestern Mackenzie, and also the discovery in Banks Island of smaller

pingos and of peat deposits of considerable thickness (Porsild, 1949; *see also* Plates VII B and VIII) suggest that considerable time has elapsed since deglaciation.

Fossil ground ice in the form of large lenses, sheets, or cores in hills along the west coast of Banks Island suggests that this part of the island was not glaciated, as do driftless areas along the northwest and north coast (Porsild, l.c.).

During the submergence, which appears to have been general throughout the Arctic Archipelago, large parts of Victoria and Prince of Wales islands and all of King William and other smaller islands were submerged. As indicated by well-preserved emerged strandlines found at elevations of up to 500 to 700 feet (150 to 210 m.) (Plate V A), this submergence profoundly changed the configuration and size of many of the islands. It also provided broader escape outlets for arctic waters into Hudson Bay, Davis Strait, and the Atlantic, and through a much deeper but perhaps not much broader Bering Strait to the Pacific. These greatly increased escape outlets for arctic waters and ice, together with a much larger proportion of sea to land in the Archipelago, certainly must have influenced the climate of the Arctic Archipelago, which then must have been more oceanic, with more precipitation, milder winters, and consequently, less heavy winter ice.

Washburn (l.c., pp. 68-69) noted that the series of well-preserved emerged strandlines on the sides of Mount Pelly near Cambridge Bay in southeastern Victoria Island (Plate X, top, and Washburn l.c., Plates 16, 17, and 18) show no evidence of having ever been disturbed or modified by ice action in the form of ice-shove ridges such as are being formed elsewhere throughout the Archipelago under present ice conditions. As Mount Pelly during the maximum submergence must have been a small island surrounded on all sides by wide expanses of sea, Washburn concludes that the absence of ice-shove marks on the strandlines on Mount Pelly indicates that the sea at the time of emergence was more ice-free than at present and that such ice as formed in the seas around Mount Pelly and elsewhere in the Archipelago was not very heavy.

Marine shells thus far discovered on emerged beaches in various parts of the Archipelago, all belong to modern arctic species and provide evidence neither for nor against a milder climate (Washburn, l.c., p. 69). Likewise, a macroscopic examination of sphagnum peat deposits near Russell Point in northeastern Banks Island, at elevations well above the highest emerged strandlines, revealed only leaves and stems of plants now growing in northern Banks Island where, on the other hand, peat formation is scarcely active under present climatic conditions. Botanical evidence strongly favouring a milder postglacial period is seen along the arctic shores of the mainland in the discontinuous distribution of a number of littoral species. These species are now absent in the central Canadian Arctic but common along the shores of Alaska, Yukon, and Mackenzie on the one hand, and in the Hudson Bay–Labrador–Ungava region, on the other.

From the discovery in many parts of the Arctic Archipelago of well-preserved drift logs and of entire whole whale skeletons several hundreds of feet above present sea-level, we know that the uplift that followed deglaciation has been rapid and general. The presence here of these whale

skeletons (*Balaena mysticetus*), high above present sea-level, and the former use of the bones of these animals by the Eskimo in the construction of their dwellings in parts of the Canadian Arctic, where in historic time no whales have been known to occur, indicate deeper seas and ice conditions more favourable than at present.

From the depth of water reported 90 years ago over a shoal in the inner harbour at Cambridge Bay, Washburn (l.c.) has estimated the present rate of emergence to be between 1·5 and 2·4 m. per century. These figures correspond fairly well with evidence derived from the discovery of Eskimo sites in King William Island, thought originally to have been near sea-level but now situated on emerged strandlines 65 to 80 feet (19·5 to 24 m.) above present sea-level (Gibson, 1939).

Botanical evidence favours the view that northern and northwestern parts of the Arctic Archipelago escaped glaciation and that the climate in the Archipelago, during deglaciation and emergence, was such that a fairly rich arctic flora could have survived there. Thus, in contradistinction to Simmons' hypothesis of an unglaciated but arid and plantless Archipelago, the writer finds that the several endemic elements in the flora of the Archipelago are surprisingly large, comprising in the aggregate no less than 62 species, or 19 per cent of the flora.

HISTORY OF BOTANICAL EXPLORATION

Simmons (1913, pp. 8 to 27) has given a full account of the exploration of the Arctic Archipelago with particular attention to the botanical work done by the early expeditions. Other accounts, stressing the geographical and historical aspects, are given by Markham (1921), Mirsky (1934), and others. Chapter IV of *The Canadian Arctic* (1951) deals with "Exploration and Historical Development" and also gives a very useful though incomplete "Annotated Chronology of Exploration" up to 1918.

In the following notes the writer has summarized the history of botanical exploration for each of the principal islands of the Western Archipelago:

Banks Island. In 1852, R. J. leM. M'Clure, having wintered near the Princess Royal Islands in Prince of Wales Strait, sailed in the *Investigator* around the south and west coasts, and reached Mercy Bay on the north coast in late September. After being ice-bound there for two winters, M'Clure and his crew abandoned the vessel and crossed on foot to Melville Island, later to return to England with members of Belcher's Expedition in the *Northstar*. The first, and for many years the only, collection of plants from Banks Island was made by J. A. Miertsching, a Moravian missionary, who accompanied the expedition as Eskimo interpreter, and by the ship's surgeon, A. Armstrong. The plants that they collected, mainly along the west and north coasts, were listed by J. D. Hooker (1857) and are in the Herbarium of the Royal Botanic Gardens at Kew, where most of them were examined by Simmons (1913) and, later, by the writer. According to Simmons' count, the collection includes 57 species of vascular plants from Banks Island.

In 1946, Miss Margaret Oldenburg of St. Paul, Minnesota, visited several places in central and northern Banks Island[1]. In 1948, J. L. Jenness of Ottawa collected a few plants at Mercy Bay.

In 1949, the writer collected plants at De Salis Bay, Nelson Head, Cape Lambton, Sachs Harbour, Bernard Island, Mercy Bay, and Russell Point. His collection totals 166 species of vascular plants, of which 109 were "new" to the flora of the island.

In 1952, T. H. Manning, zoologist, and A. Macpherson, both of Ottawa, made a small collection of vascular plants, mainly at De Salis Bay, Nelson Head, Masik Pass, Cape Kellett, Storkerson Bay, and Cape Crozier. Among the plants were five not previously collected on the island; three of them unrecorded from the Arctic Archipelago. A preliminary report of the expedition has been given by Manning (1953).

In 1953, T. H. Manning, assisted by I. M. Sparrow of Cove, England, again collected some plants, chiefly in the places visited the previous year. All but one, which was new to the Archipelago, were represented in the collections made the preceding year. Both collections are in the National Herbarium at Ottawa and are enumerated in the present report. All told, 172 species of vascular plants are today known from Banks Island.

Victoria Island. The earliest collection of plants from this island was made by John Rae, who, in 1851, from his base on Great Bear Lake, crossed from the mainland and pushed eastward along the south coast of Victoria Island. A list of his plants was published by J. D. Hooker (1857), who, unfortunately, did not distinguish between those collected on Victoria Island and those taken on the mainland. Fortunately, Rae's original labels are preserved in London and according to Simmons (1913) show that 33 species of vascular plants were collected by Rae in Victoria Island. About the same time, Armstrong and Miertsching of M'Clure's expedition in the *Investigator*, collected a few plants along the west coast of the island. Collinson's ship *Enterprise* wintered in 1851–52 at Walker Bay and in 1852–53 at Cambridge Bay. From these places, and from Minto Inlet and Prince Albert Sound, the ship's surgeon, Mr. Anderson, made fine collections, and added no less than 61 species to those previously collected by Rae, Armstrong, and Miertsching, thereby bringing the total number of vascular species then known from Victoria Island to 100.

Frits Johansen and Diamond Jenness, members of the Canadian Arctic Expedition under Vilhjalmur Stefansson, 1913–18, collected a few plants along the south shore and on Wollaston Peninsula. They are listed in the present treatment, where some of the original determinations by Macoun and Holm (1921) have been revised. Y. O. Fortier, of the Geological Survey of Canada, Ottawa, in 1947 collected a few plants at Cambridge Bay and at Greely Harbour on the east coast. J. L. Jenness, of Ottawa, in 1948 collected about a dozen plants at Richard Collinson Inlet on the north coast and a few near the northeast corner of the island.

[1] Miss Margaret Oldenburg, between 1942 and 1954, has made a number of trips to the Canadian Arctic, where, travelling mostly by chartered aircraft, she has been to a number of places rarely visited by tourists. According to information kindly supplied in a letter dated June, 1954, the chronology of Miss Oldenburg's travels in the Arctic Archipelago is as follows: Banks Island, 1946 and 1954; Victoria Island, 1942, 1943, 1944, 1945, and 1946; King William Island, 1946; Melville Island, 1944.

In all, or most, of these places Miss Oldenburg collected plants. Her arctic collections, now said to number several thousand specimens, are deposited in the Herbarium of the University of Minnesota, where, unfortunately, the plants remain unnamed and inaccessible.

In 1949, from July 28 to August 27, the writer, as the first professional botanist to visit the western islands of the Archipelago, made brief visits to Read Island, the interior of Wollaston Peninsula, the head of Prince Albert Sound, Holman Island Post, Minto Inlet, Walker Bay, Cambridge Bay, and to a few places in the interior. Although time often did not permit more than a few hours' collecting at each place, and in some places less, his collection roughly doubled the number of vascular plants previously known from the island, 201 species being the present figure, and in his combined collections from Banks and Victoria islands, no less than 35 species had not previously been recorded from the Arctic Archipelago. Future collecting, especially along the more favoured west coast undoubtedly will add materially to this number.

In 1950 E. H. Smith and D. K. Sweetman, entomologists with the Department of Agriculture, Ottawa, made a small collection of plants at Holman Island Post, and in 1952 D. P. Gray and B. Gibbard, likewise entomologists with the Department of Agriculture, collected a few plants at Cambridge Bay. Both collections are in the Herbarium of the Central Experimental Farm at Ottawa, but unfortunately were not available for examination at the time of writing.

Prince of Wales Island. As far as the writer is aware, the only collection of plants from this island was made by Y. O. Fortier of the Geological Survey of Canada, who, in 1947, collected 12 species of vascular plants, now in the National collection. These are listed in the present treatment.

King William Island. Klutschack, in 1879, made a small collection of plants that was named by Willkomm and listed by Klutschack (1881). In 1904–5, the Gjøa Expedition, under Captain Roald Amundsen, wintered at Gjoa Haven on the south coast, where, during the summers of 1904 and 1905, A. H. Lindström and Godfred Hansen collected the plants that formed the basis for Ostenfeld's report (1910), in which 63 species of vascular plants are listed. Almost identical sets of the plants are in Oslo and Copenhagen, and duplicates have been distributed to a number of other herbaria.

In 1923, Knud Rasmussen, leader of the Danish Fifth Thule Expedition collected 53 species of vascular plants, of which four had not been collected by the Gjøa Expedition. The plants were listed by Grøntved (1936) and are in the Botanical Museum, Copenhagen. In 1939, C. W. Larsen, an employee of the Hudson's Bay Company, then stationed at the Company's post at Gjoa Haven, collected 52 species of vascular plants, of which no less than eight had not previously been reported from the island. The collection, which is in the National Herbarium, Ottawa, was named by the author and is enumerated in the present report. In 1947, Y. O. Fortier of the Geological Survey of Canada collected a few plants, all previously reported from the island. The total number of vascular plants thus known from King William Island is 85.

Boothia Peninsula. According to Simmons (1913), James C. Ross, a member of John Ross' expedition (1829–33), collected 67 plants that probably came from the east coast of Boothia. In 1951 J. G. Chillcott, an entomologist collector for the Department of Agriculture, Ottawa,

brought back 69 vascular plants from Spence Bay, among them three that had not previously been recorded from the western Canadian Archipelago. A list was published by W. J. Cody (1953). The plants, which I have not seen, are in the herbarium of the Central Experimental Farm, Ottawa.

Prince Patrick Island. The island was discovered in 1819–20 by members of Parry's expedition, but except for two specimens of vascular plants first collected by M'Clintock in 1850–54, our knowledge of the flora is due entirely to two recent collections by S. D. MacDonald, zoological collector of the National Museum of Canada. Mr. MacDonald, in 1949 and again in 1952 spent several months in the vicinity of the weather station at Mould Bay. His combined collections total 64 species of vascular plants, all in the National Herbarium, and are enumerated in the text of the present report. A second collection from Mould Bay was made in 1952 by P. F. Bruggemann, entomological collector for the Department of Agriculture, and deposited in the herbarium of the Central Experimental Farm at Ottawa, where unfortunately, it was not available for study at the time of writing.

Melville Island. The first and only important collection of plants from this island was made in 1819–20 by officers of Parry's expedition, whose extensive botanical collections are preserved mainly in the British Museum of Natural History, London, and formed the basis of Robert Brown's classic work on the flora of Melville Island (Brown, 1824). According to Simmons (1913), M'Clintock, 1850–54, collected 21 plants in Melville Island. A few of them, from the herbarium of W. C. Trevelyan, have come to Kew Herbarium. Hennessey and McMillan, 1908–9, as members of a Canadian Government Expedition to Melville Island, in the *Arctic*, under the command of Capt. Bernier, added only a few species to those listed by Brown (Macoun, 1910). No professional botanist has ever visited the island, which is among those in the Archipelago that in recent years has received the least attention from exploring scientists. According to the writer's revision, the number of vascular plants known from Melville Island today is 83.

Bathurst and Cornwallis Islands. Practically nothing is known of the flora of the first of these islands, from which Simmons listed only nine species, whereas from Cornwallis he knew 38. Polunin (1940), who included Cornwallis Island in the area dealt with by him, added no new information. In 1949, 1950, and again in 1954, Dr. Henry B. Collins, Jr., archaeologist of the Smithsonian Institution, Washington, collected plants in the vicinity of ancient Eskimo sites near Resolute. His collections, together with several smaller ones made by various government officials, who in recent years have visited Resolute, bring the number of species of vascular plants known from Cornwallis Island to 68. The Collins collection and other later ones are in the National Herbarium at Ottawa, and the plants are listed in the present report.

The Sverdrup Islands. Except for half a dozen plants collected at Isachsen in Ellef Ringnes Island, all common and ubiquitous, nothing is known of the flora of this group.

Axel Heiberg Island. Isachsen, a member of the Second Norwegian Arctic Expedition in the *Fram*, in 1901, collected 34 species of vascular plants, chiefly along the south and east coasts. All were collected in winter or spring during sledging expeditions and are listed by Simmons (1913). In 1953, the writer, as a member of an expedition sponsored by the Tower Company of Montreal, visited the Mokka Fiord region of central Axel Heiberg Island, when 248 numbers of vascular plants, lichens, and bryophytes were collected around the base camp and in the course of a trip on foot from the head of the fiord to the central plateau and ice-cap. The expedition's aircraft made several successful landings on a 7-mile-long lake at the head of Mokka Fiord but because of poor flying conditions was unfortunately unable to land elsewhere on the island. Future exploration undoubtedly will add considerably to the 67 species of vascular plants reported from Axel Heiberg Island in the text of the present paper.

Islands in the Western Arctic Archipelago and places from which botanical collections are cited in the text, together with their approximate geographical latitude and longitude are as follows:

Banks Island: 71°–74° 30′ N.; 115° 20′–125° W.

1. De Salis Bay: 71° 30′ N.; 122° W.
2. Nelson Head: 71° N.; 123° W.
3. Cape Lambton: 71° 30′ N.; 123° 30′ W.
4. Sachs Harbour: 71° 50′ N.; 124° 30′ W.
5. Storkerson Bay: approx. 73° N.; 124° W.
6. Bernard Island: 73° 30′ N.; 123° 30′ W.
7. Ballast Beach; Cape M'Clure and Cape Crozier: approx. 74° 30′ N.; 121°–122° W.
8. Castel Bay: 74° 10′ N.; 119° 30′ W.
9. Mercy Bay: 74° 10′ N.; 119° W.
10. Lake inland west of Russell Point: 73° 30′ N.; 116° W.
11. Russell Point: 73° 30′ N.; 115° 20′ W.

Victoria Island: 68° 30′–73° 30′ N.; 101°–119° W.

1. Cambridge Bay: 69° 07′ N.; 105° 01′ W.
2. Tahoe and Washburn lakes: approx. 69° 40′–70° 05′ N.; 107° 30′ W.
3. Interior northeast of foot of Albert Edward Bay: approx. 70° N.; 104° W.
4. Read Island: approx. 69° 10′ N.; 115° W.
5. Interior of Wollaston Peninsula: approx. 69° 40′–50′ N.; 116°–117° W.
6. Head of Prince Albert Sound: 70° 20′ N.; 111° 30′ W.
7. Interior northeast of Prince Albert Sound: approx. 71° N.; 111° W.
8. Holman Island Post: 70° 30′ N.; 117° 38′ W.
9. Head of Minto Inlet: approx. 71° 40′ N.; 115° W.
10. Walker Bay: 71° 30′ N.; 123° W.
11. Richard Collinson Inlet: approx. 72° 50′ N.; 114° W.

King William Island: 68° 30′–70° N.; 95°–99° 30′ W.

1. Gjoa Haven: 68° 38′ N.; 96° 30′ W.

Prince of Wales Island: 71° 20′–73° 55′ N.; 96°–103° W.

1. Ommanney Bay: approx. 72° 30′ N.; 102° W.

Boothia Peninsula: 69° 25′–72° N.; 91° 30′–123° W.

1. Spence Bay: 69° 30′ N.; 93° 30′ W.

NORTHERN ISLANDS:

Prince Patrick Island: 75° 50′–77° 40′ N.; 115° 30′–123° W.
1. Mould Bay: 76° 16′ N.; 119° 50′ W.

Melville Island: 74° 30′–76° 55′ N.; 105° 30′–117° 30′ W.
1. Winter Harbour: 74° 50′ N.; 111° W.
2. Liddon Gulf: approx. 75°–75° 15′ N.; 112°–115° W.

Bathurst Island: 75°–76° 40′ N.; 97° 30′–103° W.

Cornwallis Island: 74° 40′–75° 35′ N.; 93° 30′–97° W.
1. Resolute: 74° 41′ N.; 94° 54′ W.

Axel Heiberg Island: 78° 10′–81° 20′ N.; 86°–95° 30′ W.
1. Hyperite Point: 78° 10′ N.; 89° W.
2. Diana Lake at head of Mokka Fiord: 79° 40′ N.; 88° W.
3. Plateau west of Mokka Fiord: 79° 30′ N.; 89°–90° W.

Ellef Ringnes Island: 77° 45′–79° 25′ N.; 98° 20′–106° W.
1. Isachsen: 78° 47′ N.; 103° 32′ W.

THE FLORA OF THE CANADIAN ARCTIC ARCHIPELAGO

Phytogeographic Divisions

Phytogeographically the North American Arctic may be divided into four major provinces: (1) the arctic parts of Alaska and Yukon, (2) the arctic parts of continental Northwest Territories and Ungava, (3) the Arctic Archipelago, and (4) arctic parts of Greenland. Each of these may again be further subdivided, but as climate and topography, and hence also the flora, are very uniform in large parts of the North American Arctic, such subdivision would be difficult and in many cases somewhat arbitrary. The writer (Porsild, 1951a) estimates the total vascular flora of this combined area at 894 species, but owing to subsequent additions, changes in species-concepts, and finer subdivision of species, that figure may have to be somewhat increased, as must the number of species assigned to each of the four provinces (*See* map fig. 5).

Of the four major provinces, arctic Alaska and Yukon have the most interesting and varied floras. The reason for this is that large parts of those territories were never glaciated and that Alaska, through hypothetical and now long submerged Beringia, was once connected to the rich floras of Asia, and through Yukon and northern British Columbia, to the north- and south-oriented Cordillera, which in Pleistocene time, before the coniferous mountain forests invaded the foothills, alpine valleys, and passes (Porsild, 1951a), must have provided a "highway" for alpine and arctic plants. Like the Cordillera, Alaska and Yukon are rich in endemic and isolated species that, together with stable or climaxed plant communities, are indicative of the great age of their floras.

Despite the vast extent of the arctic zone in continental Northwest Territories and Ungava, its flora of 650-odd species of vascular plants is very uniform. One reason for this uniformity is the absence of high mountain barriers; another, the uniformly dry, continental climate of the interior plains and the low and moderate relief that does not generally

provide a variety of plant habitats. Of even greater significance is the fact that the flora, compared with that of Alaska, Yukon, and other parts of the North American continent, is very young, because the land it now occupies in comparatively recent time was covered by a continental ice-sheet. The youthful aspects of its flora are clearly indicated by unstable, pre-climax plant communities, and by the fact that comparatively few species or races of vascular plants are endemic to the region. It is no less significant that comparatively few species of Asiatic or Cordilleran affinity have crossed the Mackenzie Valley that now rather sharply divides the flora of the interior continental plains from that of Alaska, Yukon, and the Bering Sea coast. Among the species recorded from the continental Arctic are several that should properly be classed as forest species: *Equisetum scirpoides, Calamagrostis canadensis* var. *Langsdorffii, C. lapponica* var. *nearctica, Hierochloe odorata, Eriophorum brachyantherum, Betula glandulosa, Anemone Richardsonii, Coptis trifolia, Astragalus eucosmus,* and *Pyrola secunda* var. *obtusata.* It is not clear whether these plants are at present invading the arctic zone because of an amelioration of the climate, or if they are lingering survivors from a former milder climatic period.

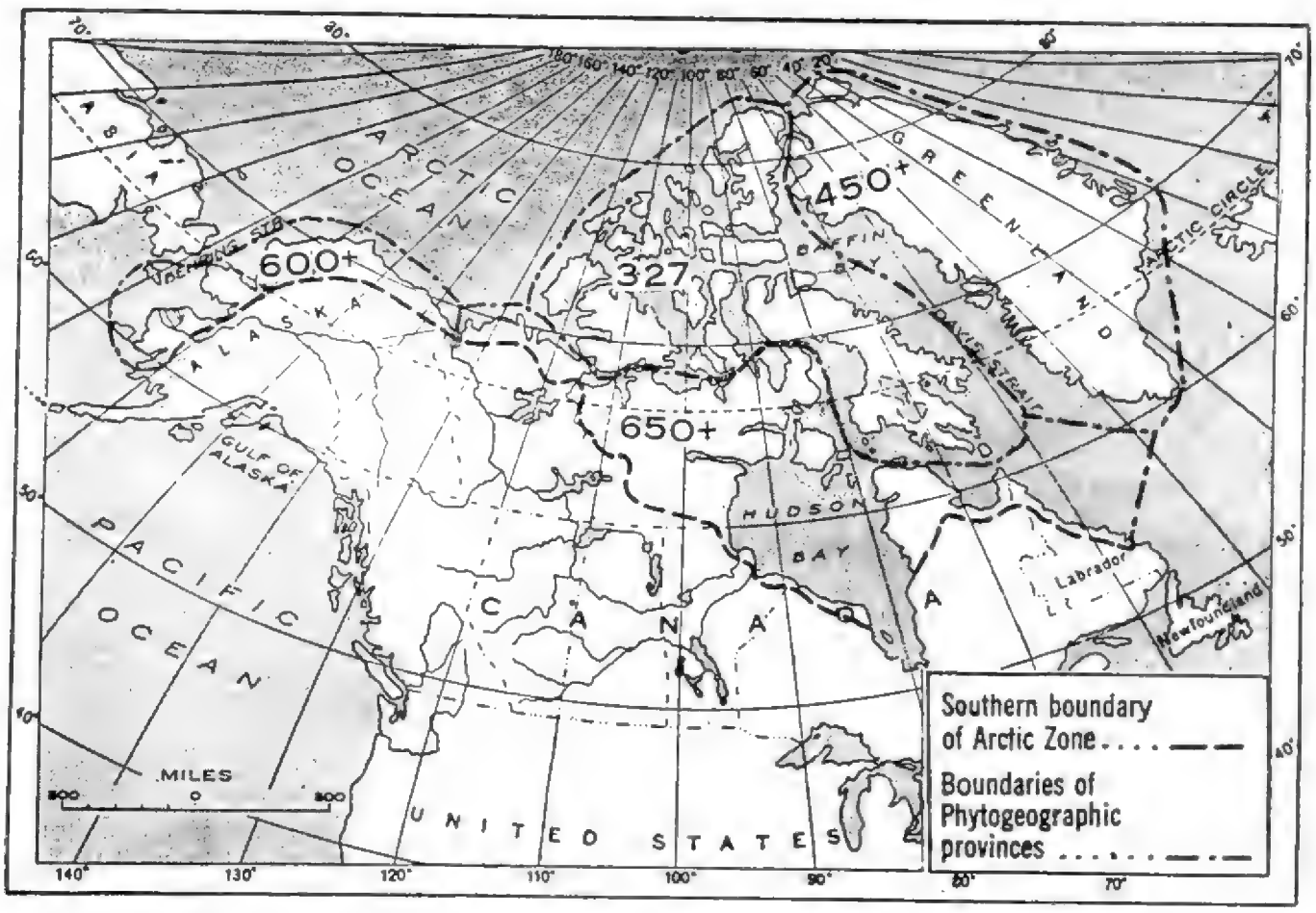

Figure 5. Boundaries of Phytogeographic Provinces.

The vascular flora of the Arctic Archipelago (327 species), though comparatively poor in species, is of considerable interest phytogeographically, on account of the relatively large percentage of endemic species and because of some very curious distributional patterns that suggest that the flora is old and has survived the Pleistocene somewhere in the Arctic

Archipelago. While definite proof of this is not yet at hand, plant life in the Archipelago today offers a number of interesting problems in survival, ecology, and distribution, because the unfavourable climatic conditions there probably closely resemble those that once existed elsewhere in the Northern Hemisphere near the edge of continental ice-sheets.

The flora of Greenland, although it has been studied longer and more intensely than that of any other arctic country, still presents some very puzzling floristic and phytogeographic problems. Considering the vast length of the Greenland coastline, from latitude 59° 46′ to 83° 39′, its flora, now estimated to comprise some 450-odd species of vascular plants, is not large. The small number of endemic species present suggests that it is relatively young compared, for example, with that of the Arctic Archipelago.

Means of Plant Dispersal and Migration

Simmons (1913, pp. 145–151) has very fully discussed the various means of plant migration and dispersal that could have served to repopulate the Canadian Arctic Archipelago, which he believed to be unglaciated during the Pleistocene but, owing to unfavourable climatic conditions, devoid of plant life.

Following many years' experience in many parts of the Arctic, the writer fully agrees with Simmons that sea-ice could well carry plant seeds over great distances, but that, except possibly in the case of littoral species, such seeds would eventually fall into the sea, and even those that might conceivably be washed upon the shore would not find suitable places to germinate. The same is true of seeds carried by sea currents. In recent years, floating ice islands have been added to the list of possible agents of plant dispersal, when plant remains were discovered imbedded in the ice (Koenig *et al.*, 1952). Such ice islands, however, could only have come from northernmost Ellesmere Island or northernmost Greenland. Like Sherard Osborn, cited by Simmons (l.c.), the writer on some occasions has observed plant seed carried by wind across snow- or ice-covered land or sea. With Simmons he believes that in the case of the northern islands wind transportation in winter may be of some importance in plant dissemination, because everywhere among the northern islands the sea is completely frozen over for more than ten months each year. Certainly, wind transportation as an agent of dispersal over sea-ice cannot be discounted, even though, as pointed out by Rae (1951, Chapter VII), the prevailing wind direction over much of the Canadian Arctic Archipelago is from the northwest. On the other hand, wind transportation over frozen sea-ice could have been of no importance in Greenland, except in the northernmost parts.

Probably of equal importance to wind is the step-by-step migration of plants by means of plant-eating birds or mammals. Thus in Banks and Victoria islands, lemmings and ptarmigans are important agents in local distribution of plants.

Distribution

The number of vascular plants known today from the Canadian Arctic Archipelago is 327, or about one and two-third times as many as were known to Simmons in 1913. Future exploration, especially of the southern parts of Banks and Victoria islands, will almost certainly add to this number. Those species likely to turn up will be mainly "southern types" that in the Archipelago today are restricted to favoured and specialized habitats where they may be "relics" from a period when the climate was warmer, or recent immigrants favoured by the present amelioration of the climate. Under present climatic conditions some of these southern types rarely reproduce by seed. A list of those species most likely to turn up in the western parts of the Archipelago is given on page 68.

In Simmons' time, comparatively little was known of the flora of the Canadian mainland, the northern Cordillera, or of alpine and arctic parts of Alaska and Yukon. It is understandable, therefore, that some of his conclusions regarding the origin and migration of the flora of the Archipelago are untenable in the light of present-day knowledge. Nevertheless, if the 195 valid species listed by Simmons from the Arctic Archipelago were regrouped according to the scheme employed in the present paper, the results, percentagewise, would probably be quite similar.

Simmons' 195 species represented 97 genera, distributed among 31 families. Representatives of the following seven additional families have since been discovered: *Potamogetonaceae, Portulacaceae, Crassulaceae, Halorhagidaceae, Gentianaceae, Lentibulariaceae,* and *Plantaginaceae.* At the same time, 15 additional genera have been added to the 97 listed by Simmons.

Table VI

Families of Vascular Plants in the Flora of the Canadian Arctic Archipelago

	Genera	Species		Genera	Species
Polypodiaceae	3	5	Leguminosae	4	16
Equisetaceae	1	3	Linaceae	1	1
Lycopodiaceae	1	2	Empetraceae	1	1
†*Potamogetonaceae	1	1	Onagraceae	1	4
Gramineae	16	39	†*Halorhagidaceae	1	1
Cyperaceae	5	43	Hippuridaceae	1	1
Juncaceae	2	10	Pyrolaceae	1	2
Liliaceae	1	2	Ericaceae	7	10
Salicaceae	1	13	†Diapensiaceae	1	1
Betulaceae	1	2	Primulaceae	2	3
Polygonaceae	3	3	Plumbaginaceae	1	1
*Portulacaceae	1	1	*Gentianaceae	2	2
Caryophyllaceae	6	26	Polemoniaceae	2	2
Ranunculaceae	5	18	Boraginaceae	1	2
Papaveraceae	1	2	Scrophulariaceae	5	13
Cruciferae	10	31	†*Lentibulariaceae	1	1
†*Crassulaceae	1	1	*Plantaginaceae	1	2
Saxifragaceae	3	17	Campanulaceae	1	2
Rosaceae	5	14	Compositae	11	29
			Total genera and species	112	327

*Families not listed from the Arctic Archipelago by Simmons, l.c., p. 133.
†Families thus far not represented in the flora of the Western Arctic Archipelago.

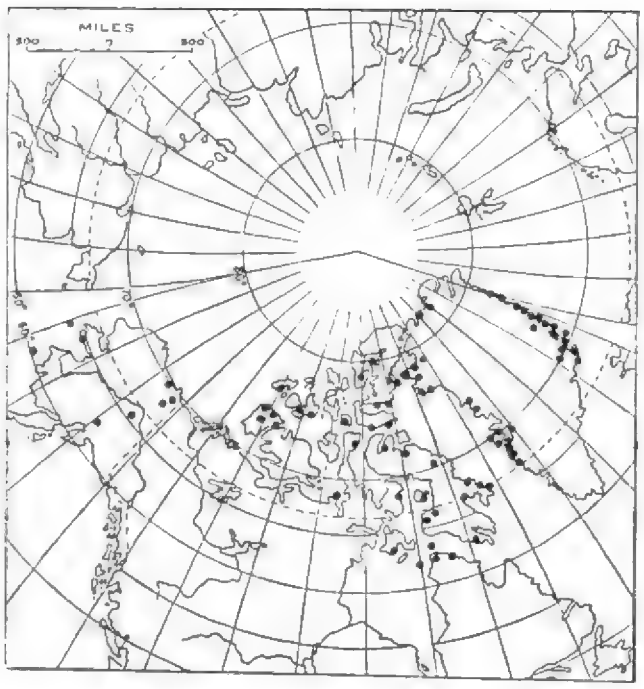

Figure 6. Circumpolar species: High-arctic group (Table VII). Arctic range of *Ranunculus sulphureus*.

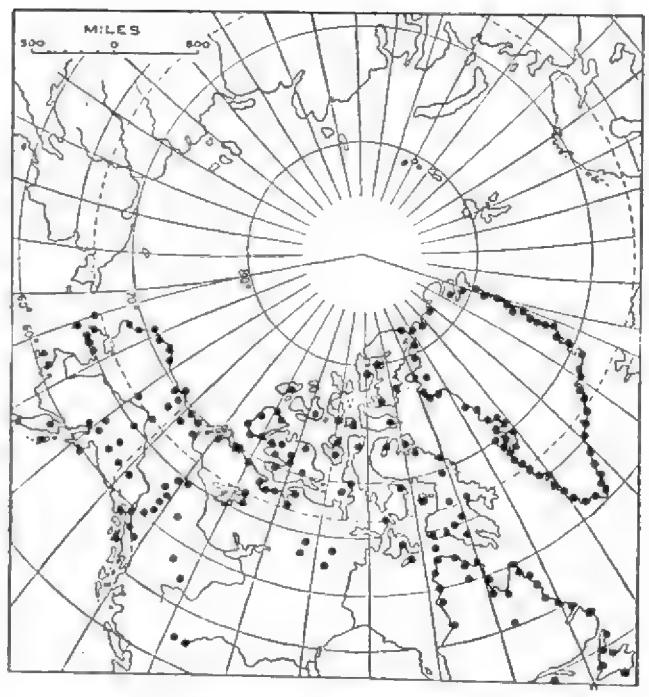

Figure 7. Circumpolar species: Arctic-alpine group (Table VIII). Arctic range of *Oxyria digyna*.

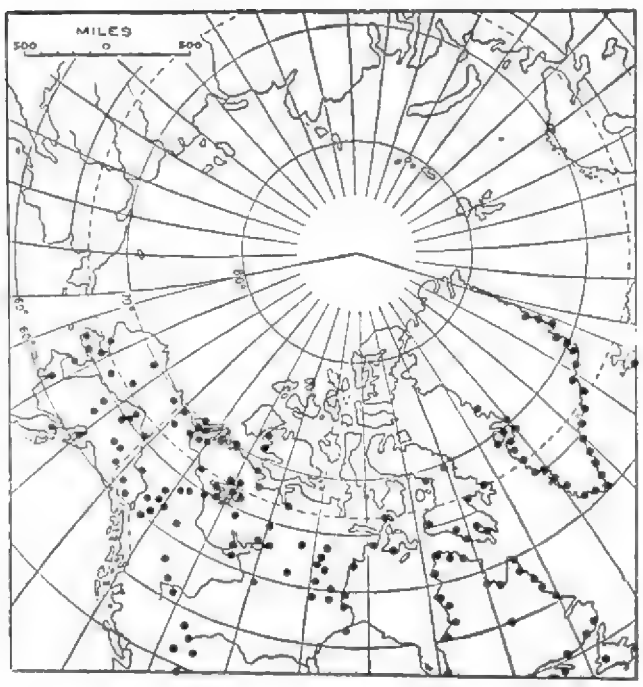

Figure 8. Circumpolar species: Low-arctic group (Table IX). Arctic range of *Tofieldia pusilla*.

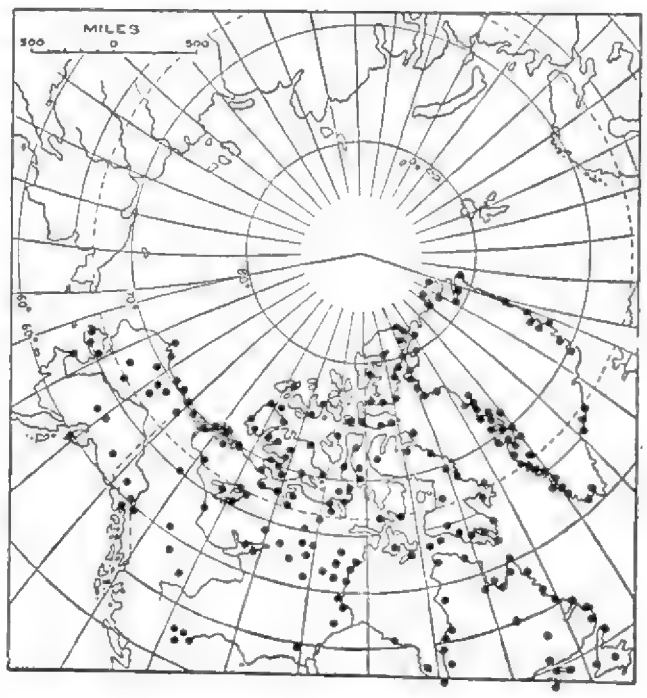

Figure 9. North American radiants: Total range of *Dryas integrifolia*. (Table X).

As might be expected, the largest increases in numbers of species have been among the "grass-like" plants, as well as in the "critical" groups and among those that are insignificant of stature and therefore easily overlooked by non-professionally trained collectors. Thus, the number of *Cyperaceae* known to Simmons from the Archipelago has been almost doubled, as has the number of species in the *Caryophyllaceae, Cruciferae, Leguminosae,* and *Compositae.*

In the following tabulations, the 327 species of vascular plants known today from the Archipelago have been sorted into four major categories according to their geographic distribution: (1) the widely distributed circumpolar plants, (2) the North American endemics or radiants, (3) the amphi-Beringian, and (4) the amphi-Atlantic. The first of these categories is subdivided, perhaps somewhat arbitrarily, into its high-, widely distributed-, and low-arctic elements; the second into one group of widely distributed plants, and four with rather narrowly restricted ranges.

In the maps (Figures 6–16) are shown the arctic or total ranges of species selected as representative for each of the eleven different groups.

Because in the North American Arctic, and particularly in the Arctic Archipelago, there are but few good phytogeographic boundaries or physiographic barriers, be it topographical or climatic, a scheme such as the one here proposed would appear to be the only one by which, with our present limited knowledge of the flora, some indications might be obtained about its age, history, and affinity. The method proposed is essentially the one employed by Hultén (1937) in his "equiformal" maps; a variation of Hultén's method has been successfully tested by Raup (1947) for a very much smaller area in the southwestern part of the Mackenzie District.

Causes for Discontinuous Distribution

The author is keenly aware of some of the obvious sources of error, corollary to the sorting of plant species into "phytogeographic" groups, especially when as yet too little is known of the edaphic and ecological requirements of the species dealt with. Among the more obvious difficulties is how to deal with the littoral or halophytic species or with those that to a variable degree are "obligate" calciphytes or oxylophytes.

The edaphic discontinuity of many arctic species has often been noted but together with their ecology has yet received little attention from botanists. Several are obligate sea-shore plants: *Elymus arenarius, Puccinellia Andersonii, P. phryganodes, Carex glareosa* var. *amphigena, C. maritima, C. ursina, C. subspathacea, Arenaria peploides* var. *diffusa, Stellaria humifusa, Ranunculus Cymbalaria, Cochlearia officinalis* ssp. *arctica, Potentilla Egedii* var. *groenlandica, Lomatogonium rotatum, Mertensia maritima,* and *Matricaria ambigua,* to mention only those found in the Arctic Archipelago. Several other species, while not strictly halophytic, nevertheless are rarely found far from the sea-shore: *Alopecurus alpinus, Dupontia Fisheri, Potentilla pulchella,* and *Primula stricta.*

Hadač (1947), in Spitsbergen, and often at considerable distances from the sea, found several otherwise obligate sea-shore plants, including *Puccinellia phryganodes, Carex subspathacea, C. ursina, C. maritima,* and *Stellaria humifusa.* He believes that recent migration inland is unlikely

and that these sea-shore plants survived in the valleys from the time of the "final phase of the last ice-age when the receding ocean still covered the bottom of the valley". In this view he is supported by Lynge (1939), who believed that plants survived the Pleistocene in Spitsbergen.

In the Canadian Arctic Archipelago, some littoral species, among them *Cochlearia officinalis*, *Carex maritima*, and also *Dupontia Fisheri* and *Alopecurus alpinus*, are commonly found far from the sea-shore and frequently at considerable elevations above sea-level. *Cochlearia* thus grew in Banks Island at 2,400 feet (800 m.) and on Axel Heiberg at 2,200 feet (730 m.) above sea-level. Their presence there may be historical, since in late post-glacial time there was a general emergence of land of a magnitude of between 500 to 700 feet (170 to 230 m.) throughout the Archipelago.

The present discontinuous distribution along the shores of the arctic Canadian mainland of certain littoral species, together with the discovery, several hundreds of feet above present sea-level, of the skeleton of a Greenland whale (*Balaena mysticetus*), far beyond the range of this animal in historic time, and of well-preserved drift logs, suggests a milder post-glacial period and a rapid uplift of the land. The following, mostly littoral species, have a fairly continuous distribution in the West along the coasts of Alaska, and in the East along the coasts of Labrador and the Hudson Bay region. They are absent, however, or show one or several large gaps in their distribution along the coast of the arctic Canadian mainland: *Poa eminens*, *Puccinellia Langeana*, *Carex Mackenzii*, *C. glareosa* var. *amphigena*, *Koenigia islandica*, *Montia lamprosperma*, *Ranunculus Cymbalaria*, *R. Pallasii*, *R. reptans*, *Potentilla Egedii*, *Lathyrus japonicus*, *Hippuris tetraphylla*, *Primula stricta*, *Lomatogonium rotatum*, *Plantago juncoides*, *Chrysanthemum arcticum*, *Tanacetum. bipinnatum*, and *Senecio Pseudo-Arnica*.

A glance at maps showing the distribution of certain North American species will at once disclose that many obligate calciphiles are absent from the acid Archaean rocks of the Laurentian Shield area (e.g. *Braya humilis*, and certain other species in *Cruciferae*) but are found on the younger and largely Palaeozoic sediments around the periphery of the Shield. On the other hand, a large number of typically oxylophytic species, notably among the *Ericaceae* and among ferns and fern-allies, may be ubiquitous on the acid rocks of the Shield but absent on the surrounding calcareous sediments. Edaphic discontinuity is even more pronounced in the Arctic, where, because of climatic conditions, such as low temperatures and low precipitation, organic soils in the form of humus, turf, or peat bogs are either lacking or at best feebly developed. Thus, in the western islands of the Archipelago many oxylophytes are rare or confined to the immediate proximity of acid or neutral intrusive rocks such as occur there in the form of diorite or dolomitic sills or dykes. Simmons (1913, p. 135), when comparing the development of vegetation on different geological formations, in Ellesmere Island, noted that the "poverty of the vegetation of the Silurian districts", composed of "hard siliciferous limestone, and their decomposition [by frost shattering] results in the heaping up of masses of angular fragments with no, or at least very little fine material among them".

In the Arctic, the problem of edaphic discontinuity is further complicated by the fact that warmth-loving plants near the northern limits of their ranges tend to become facultative calcicoles, often confined to stony, calcareous soils. The reason may be that these soils alone afford them optimal physical conditions of temperature, water supply, and aeration.

Owing to low soil temperatures, nitrogen fixation by bacterial action is lacking or feeble; soil micro-organisms are few, and even organic decay is extremely slow. For this reason nearly all arctic soils are oligotrophic, particularly in regard to nitrates and phosphates. Wherever these become available, as for example in the presence of animal dung, near bird cliffs or rookeries, animal burrows or human habitations, most arctic plants respond by lush and rank growth. Under extreme arctic conditions a number of arctic plants become coprophilous. Thus in Banks and Victoria islands a number of species were found only on owl perches.

Common for the widely distributed arctic species is their astounding temperature tolerance and adaptability to large amplitudes in day-length, from the extreme of 24 hours of daylight throughout the growing season in Ellesmere Island to a maximum of 15 hours and 10 minutes in the latitude of Pike's Peak in Colorado, more than 43 degrees of latitude south of Cape Columbia in Ellesmere Island. Possibly the great differences between day-length (photoperiod) in high-arctic and high alpine stations far to the south may be compensated for by different actinic values of sunlight in the rarified atmosphere of high elevations in low latitudes, and those of the high-arctic where the actinic values are low because of the low elevation of the sun and the resultant thickness of the atmosphere through which the light must pass. Against this explanation speaks the fact that some of the same species growing in Ellesmere Island and on Pike's Peak also grow successfully at sea-level in James Bay, or in the Gulf of St. Lawrence. Perhaps the answer is that several, if not all, of these species are composed of ecotypes having different photoperiod requirements.

The following are among the arctic-alpine plants having a very considerable north-south range and therefore a large tolerance for amplitude in day-length. Many of these in the North American Arctic grow north to or beyond the 80th parallel, and the range of all extends far south in the mountains of Eastern or Western North America, some even as far south as Colorado.

Widely distributed circumpolar plants:

Woodsia glabella, Cystopteris fragilis s. lat., Lycopodium Selago, Equisetum arvense, E. variegatum, Phippsia algida, Festuca brachyphylla, Poa arctica, P. glauca, Trisetum spicatum s. lat., Kobresia myosuroides, Eriophorum Scheuchzeri, Carex misandra, C. rupestris, Juncus biglumis, Luzula confusa, Salix arctica, Oxyria digyna, Polygonum viviparum, Arenaria rubella, Melandrium apetalum ssp. *arcticum, Ranunculus hyperboreus, R. pedatifidus, R. pygmaeus, Cardamine bellidifolia, Draba lactea, Erysimum*

Pallasii, Lesquerella arctica s. lat., Saxifraga cernua, S. oppositifolia, S. rivularis, Epilobium latifolium, Empetrum nigrum s. lat., Pyrola grandiflora, Androsace septentrionalis s. lat., and *Pedicularis capitata.*

Widely distributed North American radiants:

Calamagrostis purpurascens, Festuca baffinensis, Carex scirpoidea, C. stans, Juncus albescens, Tofieldia coccinea, Arenaria humifusa, A. Rossii, Melandrium affine, Silene acaulis var. *exscapa, Stellaria laeta, St. monantha, Anemone parviflora, A. Richardsonii, Saxifraga tricuspidata, Dryas integrifolia, Hedysarum Mackenzii, Arctostaphylos rubra, Pedicularis arctica, Campanula uniflora, Arnica alpina* ssp. *angustifolia, Crepis nana,* and *Erigeron compositus.*

Composition of the Flora

The Widely Distributed Circumpolar Species

(143 species or 43·9%)

This group of plants obviously owe their wide distribution, at least in part, to their extraordinary adaptability and tolerance to climatic, day-length, and edaphic conditions. They are, on the whole, continental species but in North America by no means restricted to the Arctic Archipelago; with one or two exceptions all reach the mainland, where the ranges of many extend south to the tree-line, or beyond. In the North American arctic flora, estimated by the writer (Porsild, 1951a) at 894 species, the circumpolar species form the largest group, contributing almost one-third of the total number of species. Among them are found many of the well-known arctic species and also many alpine ones. In the Arctic Archipelago, where the flora is predominantly arctic in composition, the widely distributed arctic species comprise nearly half, or 44 per cent of the flora. Of the 143 belonging in this group, thus far only 108 have been found in the western islands of the Archipelago, whereas 140 are known to occur in the eastern islands; nearly all of the 35 not found in the west are low-arctic species and in the Eastern Arctic are found only in southern Baffin Island.

Inasmuch as all species in this group are wide ranging, an attempt to subdivide them must necessarily be somewhat arbitrary. Some species, however, definitely are less arctic in their ranges than are others, and on this basis three divisions have been set up within this group.

Widely Distributed Circumpolar Plants. High-Arctic Group

The first, which is called the "high-arctic group", comprises 33 species. All range north beyond the 80th parallel, and most of them as far as land extends toward the Pole. A large number have isolated, often widely separated stations in high mountains of the west, though a few are found at sea-level south beyond the 50th parallel in James Bay, and still farther south in the Gulf of St. Lawrence. For an example of this type of distribution *see* map fig. 6 showing the arctic range of *Ranunculus sulphureus.*

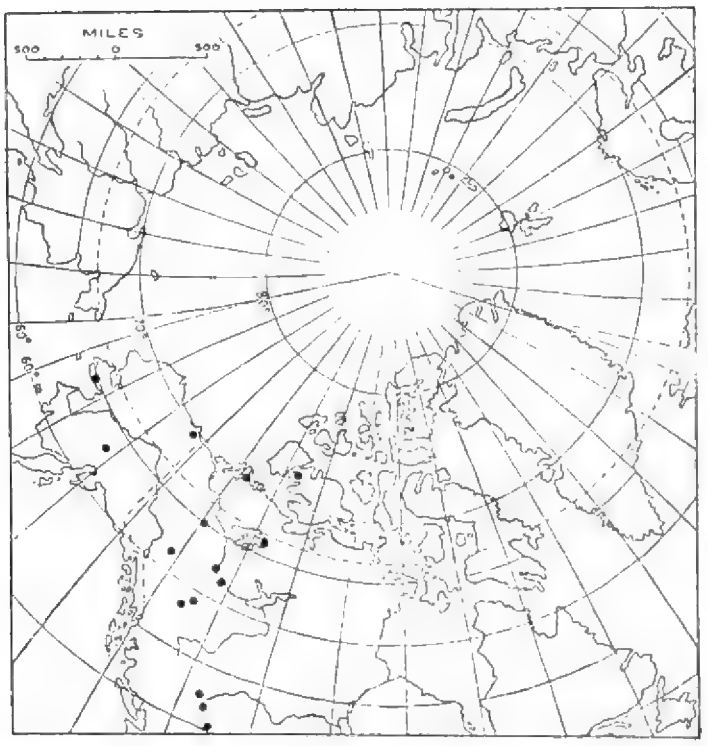

Figure 10. Cordilleran endemics: (Table XI). Total range of *Carex petricosa*.

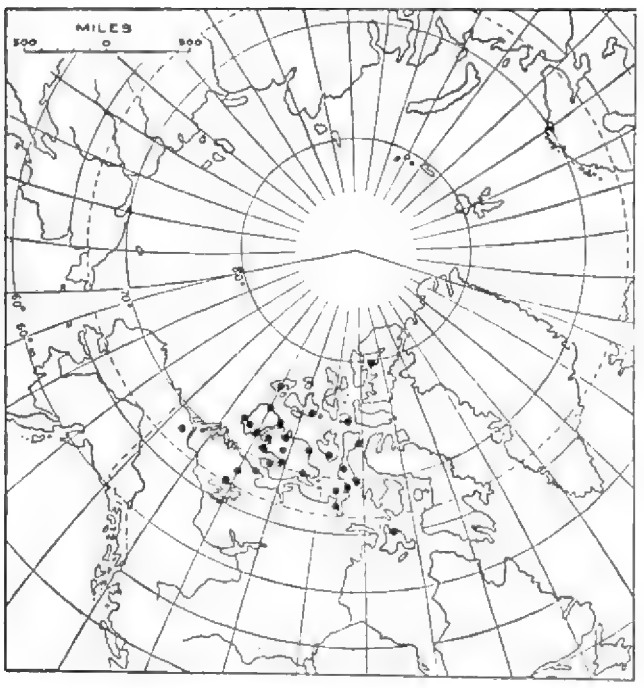

Figure 11. Arctic Archipelago endemics: (Table XII). Total range of *Parrya arctica*.

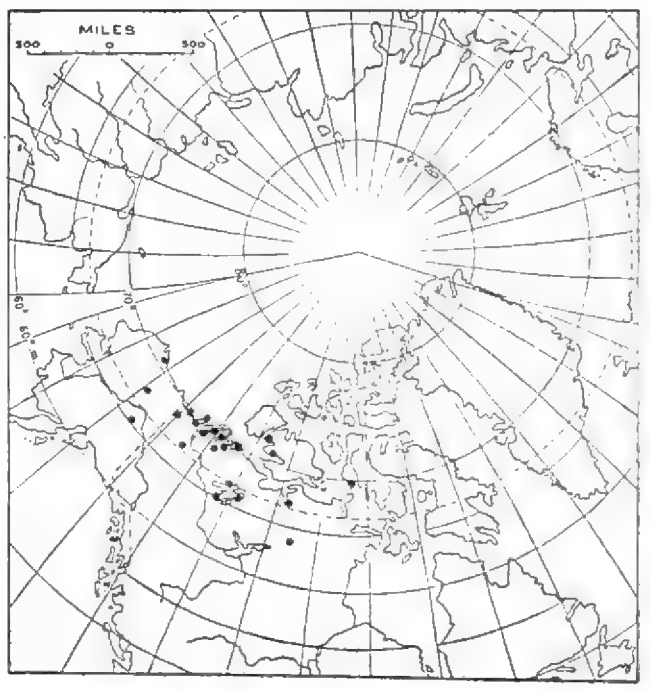

Figure 12. Western Arctic endemics: (Table XIII). Total range of *Kobresia hyperborea*.

Table VII

High-arctic group (33 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Alopecurus alpinus	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dupontia Fisheri	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
D. Fisheri ssp. *psilosantha*	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hierochloe pauciflora	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phippsia algida	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Puccinellia angustata	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
P. phryganodes	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kobresia myosuroides	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carex amblyorhyncha	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
C. atrofusca	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
C. subspathacea	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
C. ursina	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Juncus biglumis	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Luzula nivalis	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Salix arctica	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Melandrium apetalum ssp. *arcticum*	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ranunculus nivalis	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
R. Pallasii	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
R. sulphureus	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X
Braya purpurascens	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X
Cochlearia officinalis ssp. *arctica*	X	X	X			X	X	X	X	X	X	X	X		X	X	X	X
Draba alpina	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X
D. lactea	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Erysimum Pallasii	X	X	X				X				X	X	X		X			X
Eutrema Edwardsii	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X
Lesquerella arctica	X	X	X		X		X					X		X	X		X	X
Saxifraga caespitosa ssp. *uniflora*	X	X	X	X	X	X		X	X	X	X	X	X		X			X
S. foliolosa	X	X	X		X	X	X	X	X	X		X	X		X	X	X	X
S. hieracifolia	X		X		X	X	X							X	X	X	X	X
S. Hirculus	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
S. nivalis	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X
Potentilla hyparctica	X	X					X	X	X	X	X	X		X	X	X	X	X
Polemonium boreale	X	X					X											X

Widely Distributed Circumpolar Plants. Arctic-Alpine Group

In the second subdivision are placed the ubiquitous, wide-ranging arctic-alpine species that in the North American Arctic nearly all extend to lat. 80° or beyond, and southward range far into the subarctic taiga. In the flora of the Archipelago 42 species belong in this group. Among them are such well-known plants as *Luzula confusa, Saxifraga oppositifolia, Empetrum nigrum s. lat.*, and *Epilobium latifolium*, which, together with many others, appear to thrive equally well near the northern tip of Ellesmere Island, in the Hudson Bay lowlands, and in mountains of eastern and western North America. In map fig. 7 is shown arctic range of *Oxyria digyna.*

Table VIII

Arctic-alpine group (42 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Woodsia alpina	×	×	×				×					×				×	×	×
W. glabella	×	×	×				×			×		×				×	×	×
Cystopteris fragilis	×	×	×		×		×	×				×	×	×		×	×	×
Dryopteris fragrans	×	×	×				×					×				×	×	×
Lycopodium Selago	×	×	×				×					×				×	×	×
Equisetum arvense	×	×	×		×	×	×					×	×	×		×	×	×
E. variegatum	×	×	×				×					×				×	×	×
Arctagrostis latifolia	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Festuca brachyphylla	×	×	×		×	×	×			×		×				×	×	×
Hierochloe alpina	×	×	×				×					×				×	×	×
Poa arctica	×	×	×				×					×				×	×	×
P. glauca	×	×	×				×					×				×	×	×
Trisetum spicatum	×	×	×				×					×				×	×	×
Eriophorum Scheuchzeri	×	×	×				×					×				×	×	×
Kobresia simpliciuscula	×	×	×				×					×				×	×	×
Carex glacialis	×	×	×				×					×				×	×	×
C. glareosa var. *amphigena*	×	×	×				×					×				×	×	×
C. maritima	×	×	×				×					×				×	×	×
C. misandra	×	×	×				×					×				×	×	×
C. rupestris	×	×	×				×					×				×	×	×
Luzula confusa	×	×	×				×					×				×	×	×
Oxyria digyna	×	×	×	×	×		×					×				×	×	×
Polygonum viviparum	×	×	×		×		×					×				×	×	×
Arenaria rubella	×	×	×		×		×					×				×	×	×
Sagina intermedia	×	×	×				×					×				×	×	×
Stellaria ciliatosepala	×		×				×					×				×	×	×
Ranunculus hyperboreus	×	×	×				×					×				×	×	×
R. pedatifidus var. *leiocarpus*	×	×	×				×					×				×	×	×
R. pygmaeus	×	×	×				×					×				×	×	×
Cardamine bellidifolia	×						×					×				×	×	×
Draba nivalis	×	×	×				×					×				×	×	×
Saxifraga cernua	×	×	×				×					×				×	×	×
S. oppositifolia	×	×	×				×					×				×	×	×
S. rivularis	×	×	×				×					×				×	×	×
Epilobium latifolium	×	×	×				×					×				×	×	×
Empetrum nigrum	×		×				×					×				×	×	×
Pyrola grandiflora	×	×	×				×					×				×	×	×
Cassiope tetragona	×	×	×				×					×				×	×	×
Vaccinium uliginosum var. *alpinum*	×	×	×				×					×				×	×	×
Androsace septentrionalis	×	×	×				×					×				×	×	×
Pedicularis capitata	×	×	×				×					×				×	×	×
P. lanata	×	×	×				×					×				×	×	×

Widely Distributed Circumpolar Plants. Low-Arctic Group

In the third subdivision belong the "low-arctic", circumpolar species, of which no less than 68 are present in the flora of the Archipelago. To this group belong a number of ubiquitous tundra plants. Many range far into the subarctic, even beyond the tree-line, but differ from the preceding groups in having a very definite northern limit. Most of them barely reach the southern perimeter of the Archipelago, a few reach the 70th parallel, and only a few have isolated stations north of the Lancaster Sound – M'Clure Strait line. Although some reach far south in the mountains in the east or the west, the temperature and day-length amplitude of the group seem narrower than those of the preceding subdivisions, and in the Archipelago many are confined to exceptionally favoured habitats such as south-facing, sheltered slopes with abundant snow cover.

In map fig. 8 is shown the arctic range of *Tofieldia pusilla*.

Table IX

Low-arctic group (68 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Woodsia ilvensis	×						×								×	×	×	×
Lycopodium annotinum var. *pungens*	×						×								×	×	×	×
Equisetum scirpoides	×	×					×								×	×	×	×
Potamogeton filiformis	×						×								×	×	×	×
Agrostis borealis	×						×								×	×	×	×
Arctophila fulva	×	×	×		×		×	×							×	×	×	×
Calamagrostis canadensis var. *Langsdorffii*	×						×								×	×	×	×
C. neglecta	×		×				×						×		×	×	×	×
Deschampsia caespitosa	×						×								×	×	×	×
Elymus arenarius ssp. *mollis*	×	×	×		×		×							×	×	×	×	×
Festuca rubra var. *arenaria*	×	×	×				×										×	×
Hierochloe odorata	×		×				×										×	
Poa alpigena	×						×								×	×	×	×
P. alpina	×						×								×	×	×	×
Eleocharis acicularis	×						×								×	×	×	×
Eriophorum angustifolium	×						×							×	×	×	×	×
E. brachyantherum	×						×								×	×		
E. russeolum var. *albidum*	×					×	×							×	×	×	×	
Scirpus caespitosus ssp. *austriacus*	×						×								×	×	×	×
Carex bicolor	×						×								×	×	×	×
C. capillaris	×		×				×					×			×	×	×	×
C. chordorrhiza	×		×				×								×	×	×	
C. gynocrates	×						×								×	×	×	×
C. Lachenalii	×						×							×	×	×	×	×
C. microglochin	×						×								×	×	×	×
C. rariflora	×		×				×								×	×	×	×
C. vaginata	×		×				×							×	×	×	×	×
Juncus castaneus	×		×				×						×	×	×	×	×	×
Luzula spicata	×														×		×	×

Table IX—Concluded

Low-arctic group (68 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
L. Wahlenbergii	X						X									X	X	X
Tofieldia pusilla	X	X	X				X									X	X	X
Salix reticulata	X		X				X									X	X	X
Koenigia islandica	X	X	X				X									X	X	X
Montia lamprosperma	X		X				X									X	X	X
Arenaria peploides	X	X	X		X		X									X	X	X
A. sajanensis	X		X				X									X	X	X
A. uliginosa	X		X				X									X	X	X
Stellaria crassifolia	X	X	X		X		X									X	X	X
S. humifusa	X		X				X									X	X	X
Ranunculus lapponicus	X	X	X		X		X					X	X			X	X	X
R. trichophyllus var. *eradicatus*	X		X				X					X				X	X	X
Draba cinerea	X	X	X		X		X									X	X	X
D. glabella	X	X	X				X									X	X	X
Chrysosplenium tetrandrum	X	X	X				X									X	X	X
Rubus Chamaemorus	X	X	X				X									X	X	X
Sibbaldia procumbens	X	X	X				X									X	X	X
Astragalus alpinus	X	X	X				X									X	X	X
Epilobium anagallidifolium	X	X	X				X									X	X	X
E. angustifolium var. *intermedium*	X						X									X	X	X
Hippuris vulgaris	X	X	X				X									X	X	X
Pyrola secunda var. *obtusata*	X		X				X									X	X	X
Arctostaphylos alpina	X	X	X				X									X	X	X
Loiseleuria procumbens	X						X									X	X	X
Phyllodoce coerulea	X						X									X	X	X
Rhododendron lapponicum	X	X	X				X						X			X	X	X
Vaccinium Vitis-Idaea var. *minus*	X		X				X									X	X	X
Lomatogonium rotatum	X		X				X									X	X	X
Mertensia maritima	X	X	X			X	X						X			X	X	X
Pedicularis labradorica	X						X									X	X	X
P. lapponica	X						X									X	X	X
P. sudetica	X	X	X		X	X	X		X				X			X	X	X
Pinguicula vulgaris	X						X									X	X	X
Campanula rotundifolia	X															X	X	X
Artemisia borealis	X		X				X									X	X	X
Erigeron unalaschkensis	X	X	X				X									X	X	X
Matricaria ambigua	X	X	X		X	X	X									X	X	X
Petasites frigidus	X	X	X				X	X	X									
Senecio congestus	X	X	X		X	X	X		X	X								

The North American Species

The second major group is composed of species that are endemic to North America or essentially "North American species". One subdivision is widely distributed, whereas four have rather narrowly restricted ranges.

North American Radiants

To the first belong "the North American radiants," represented in the flora of the Archipelago by 58 species that in North America have a range similar to those of the circumpolar species, which they resemble in their wide climatic, edaphic, and day-length tolerance. Their spacial range in North America is very wide; some are without northern limits and extend across arctic and subarctic North America, from Alaska to Labrador and Baffin Island; a good many are found in West Greenland; a few have reached East Greenland or even Spitsbergen or arctic continental Europe; and the ranges of a few extend a short distance into eastern Siberia. To this group belong such typically American species as *Carex scirpoidea, C. membranacea, Betula glandulosa, Anemone Richardsonii, Parnassia Kotzebuei, Saxifraga tricuspidata, Dryas integrifolia,* and *Erigeron compositus.*

In map fig. 9 is shown the total range of *Dryas integrifolia.*

Table X

North American radiants (58 species or 17·6%)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Agropyron latiglume	×	×	×				×			×	×	×	×		×	×	×	×
Calamagrostis purpurascens	×	×	×				×				×	×			×	×	×	×
C. lapponica var. *nearctica*	×						×						×		×	×	×	×
Festuca baffinensis	×	×	×			×	×			×	×	×	×	×	×	×		×
Puccinellia Langeana ssp. *typica*	×												×		×	×	×	×
P. vaginata			×				×								×			×
Eriophorum callitrix	×	×	×				×							×	×	×	×	×
Carex holostoma	×						×							×	×	×	×	×
C. membranacea	×	×	×	×	×	×	×					×	×	×	×	×		
C. scirpoidea	×	×	×			×	×						×	×	×	×	×	
C. stans	×	×	×		×	×	×	×	×	×	×	×	×	×	×	×	×	×
C. supina ssp. *spaniocarpa*	×						×								×	×	×	×
Juncus albescens	×	×	×				×					×	×	×	×	×	×	×
Tofieldia coccinea	×	×	×				×						×		×	×	×	×
Salix arctophila	×					×	×					×		×	×	×	×	×
S. planifolia							×								×	×	×	
S. Richardsonii	×	×	×			×	×							×	×	×		
Betula glandulosa	×		×				×								×	×	×	×
Arenaria humifusa	×					×	×			×		×	×		×	×	×	×
A. Rossii	×	×	×			×	×		×	×		×	×	×	×		×	×
Cerastium Beeringianum	×	×	×	×		×	×	×						×	×	×	×	
Melandrium affine	×	×	×		×		×		×	×	×	×	×	×	×	×	×	×
Silene acaulis var. *exscapa*	×	×	×		×	×	×		×		×	×	×	×	×	×	×	×
Stellaria laeta	×	×	×	×	×		×		×	×	×	×	×		×	×	×	×
S. monantha	×	×	×		×	×	×					×	×		×	×	×	×
Anemone parviflora	×	×	×				×									×	×	
A. Richardsonii	×		×				×									×	×	×
Coptis trifolia	×														×	×	×	×
Ranunculus Cymbalaria var. *alpinus*	×		×				×										×	×

Table X—Concluded

North American radiants (58 species or 17·6%)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Draba crassifolia	×						×								×	×		
Cardamine pratensis var. *angustifolia*	×	×	×		×	×	×	×				×	×	×	×	×	×	×
Halimolobos mollis	×						×								×			
Parnassia Kotzebuei	×						×								×			
Saxifraga tricuspidata	×	×	×		×	×	×		×	×	×	×	×	×	×	×	×	×
Dryas integrifolia	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Potentilla Egedii var. *groenlandica*	×		×				×										×	×
Astragalus eucosmus	×						×								×			
Hedysarum Mackenzii	×	×	×				×								×	×		
Oxytropis foliolosa	×						×								×	×		
O. hudsonica							×								×			
O. Maydelliana	×	×	×		×	×	×		×					×	×			
O. podocarpa															×			
Myriophyllum exalbescens	×						×								×			×
Arctostaphylos rubra	×		×				×								×	×		
Ledum decumbens	×		×				×								×	×		
Primula stricta	×	×	×				×								×	×	×	
Pedicularis arctica	×	×	×		×	×	×		×						×	×	×	
Veronica alpina var. *unalaschensis*	×						×								×	×	×	
Campanula uniflora	×	×	×				×		×						×	×	×	
Antennaria angustata	×						×					×	×	×	×	×	×	×
A. Ekmaniana	×				×		×					×	×		×	×	×	×
Arnica alpina ssp. *angustifolia*	×	×	×			×	×				×	×			×	×	×	×
Chrysanthemum integrifolium	×	×	×		×	×	×						×	×	×	×	×	
Crepis nana	×		×				×							×	×	×	×	
Erigeron compositus	×	×	×				×		×		×	×			×			×
E. eriocephalus	×	×	×				×	×			×	×			×	×	×	×
Solidago multiradiata	×		×				×								×		×	
Taraxacum lacerum	×	×	×		×	×	×	×						×	×	×	×	×

The Cordilleran Endemics

The "Cordilleran endemics", represented by 10 species in the flora of the Archipelago, form a small arctic extension of a large group of alpine or foothill species that are essentially peculiar to the Rocky Mountains and to intermontane plateaux of the North American Cordillera, where several range south beyond the 50th parallel. In the Archipelago, this small but significant group is largely confined to the western islands, where all have their northern limits in Banks and Victoria islands. In the flora of the Archipelago, this small group forms a rather isolated element, with no close affinity to other species or groups in the flora. All are of rare or local occurrence in the Archipelago, where their presence offers a rather strong argument for survival there during the Pleistocene. In map fig. 10 is shown the total range of *Carex petricosa*.

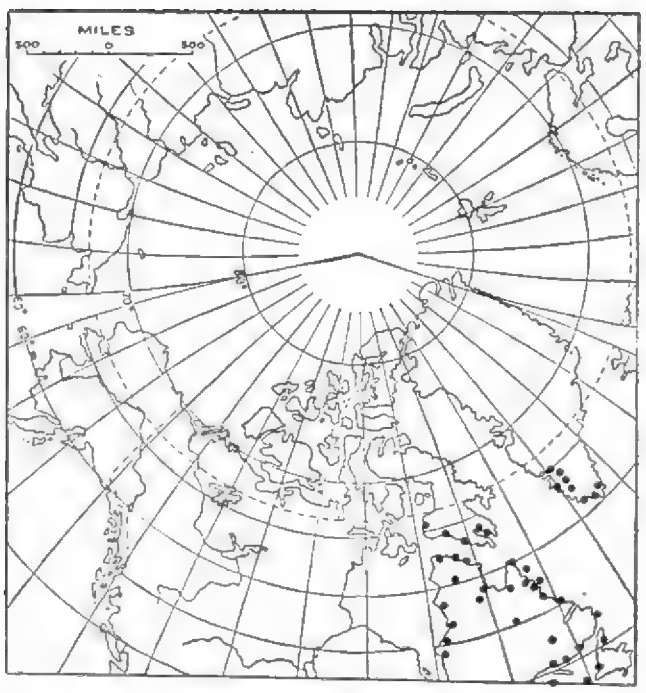

Figure 13. Eastern Arctic endemics: (Table XIV). Arctic range of *Salix Uva-Ursi.*

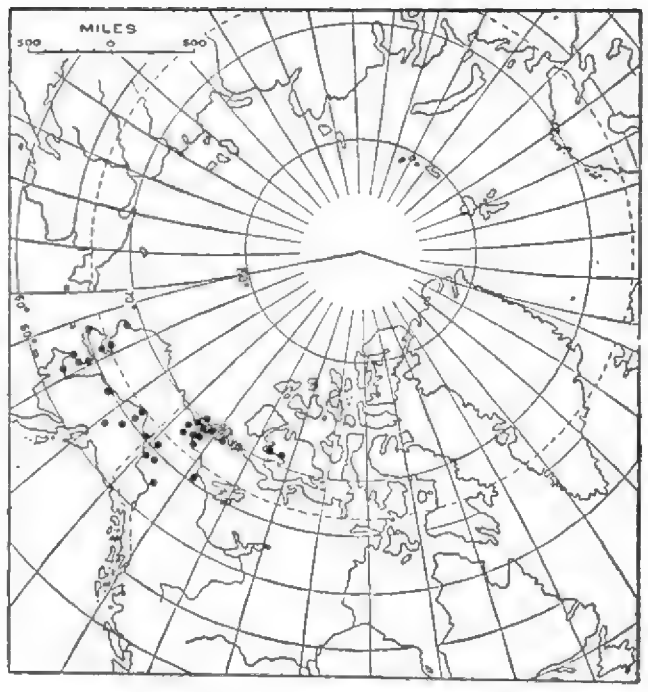

Figure 14. Amphi-Beringian species: (Table XV). Arctic range of *Carex lugens.*

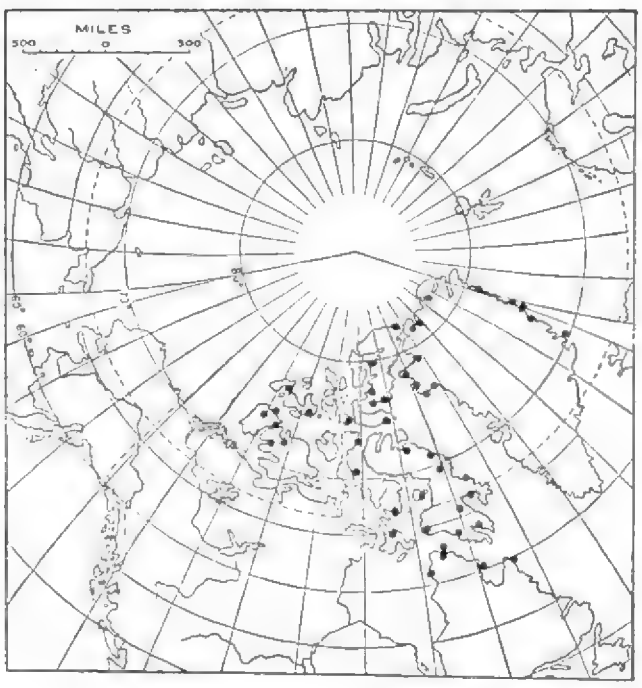

Figure 15. Amphi-Atlantic species: Northern group (Table XVI). Total range of *Pleuropogon Sabinei.*

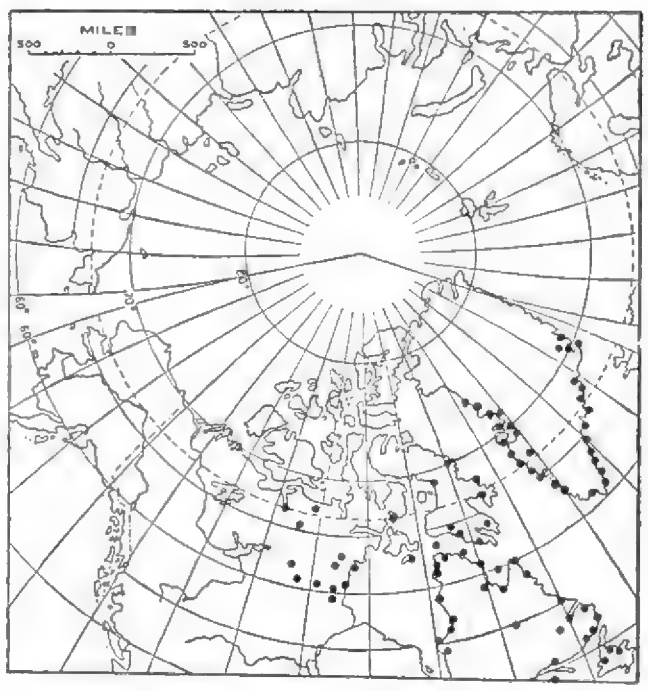

Figure 16. Amphi-Atlantic species : Southern group (Table XVII). Arctic range of *Diapensia lapponica.*

Table XI

Cordilleran endemics (10 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Carex petricosa	×		×				×											
Melandrium Ostenfeldii	×		×				×											
Pulsatilla ludoviciana	×	×					×											
Lupinus arcticus	×	×	×				×											
Oxytropis glutinosa	×	×	×				×											
Linum Lewisii	×	×	×				×											
Gentiana arctophila	×	×	×				×											
Plantago septata	×	×	×				×											
Erigeron grandiflorus	×		×				×											
Senecio hyperborealis	×	×					×											

Arctic Archipelago Endemics

The "Arctic Archipelago endemics", of which there are no less than 26, are high-arctic plants adapted to a dry continental climate. Only a few are completely endemic to the Archipelago, where, nevertheless, all but one have their main area of distribution. Most of the species in the group range across to northernmost Greenland and south to the northern rim of the American continent.

Some species in this group have only recently been described, and as yet little is known of their ranges: *Calamagrostis chordorrhiza, Puccinellia agrostidea, P. Andersonii, P. Bruggemanni,* and *P. poacea*; such species as *Mertensia Drummondii, Erigeron grandiflorus,* and *Aster pygmaeus* are distinctly local and rare. Some others, although rare and poorly represented in most arctic herbaria, are in fact exceedingly common or even ubiquitous, at least in Banks and Victoria islands: *Parrya arctica, Oxytropis arctica, O. arctobia, Potentilla rubricaulis,* and *P. Vahliana. Melandrium triflorum,* long known only from northern Greenland where it has a wide range, in recent years has been collected in several widely separated stations across the northern islands of the Archipelago. In map fig. 11 is shown the total range of *Parrya arctica.*

Probably the closest phytogeographic affinity of the Arctic Archipelago endemics—through the "Western Arctic endemics"—is with the Cordilleran rather than with the circumpolar or the amphi-Beringian plants. As with the Cordilleran it seems most likely that they survived the Pleistocene somewhere in the Archipelago.

Table XII

Arctic Archipelago endemics (26 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Calamagrostis chordorrhiza							×	×										
Puccinellia agrostidea		×	×				×	×	×	×	×	×	×	×	×	×	×	×
P. Andersonii	×	×	×				×	×	×	×	×	×	×	×	×	×	×	×
P. Bruggemanni		×	×				×	×	×									
P. poacea		×	×				×	×	×									
Cerastium arcticum		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Melandrium triflorum		×	×		×	×	×	×	×	×	×	×	×	×	×	×	×	×
Ranunculus Sabinei	×	×	×				×	×	×	×	×	×	×	×	×	×	×	×
Papaver radicatum		×	×				×	×	×	×	×	×	×	×	×	×	×	×
Braya humilis ssp. *arctica*		×	×				×	×	×	×	×	×	×	×	×	×	×	×
B. Thorild-Wulffii		×	×				×	×	×									
Draba Bellii		×	×				×	×	×									
D. groenlandica		×	×				×	×	×	×	×	×	×	×	×	×	×	×
D. oblongata		×	×				×	×	×									
Parrya arctica		×	×				×	×	×									
Potentilla rubricaulis	×	×	×				×	×	×	×	×	×	×	×	×	×	×	×
P. Vahliana		×	×		×	×	×	×		×	×	×		×	×	×	×	×
Astragalus Richardsonii		×	×				×											
Oxytropis arctica		×	×				×	×	×									
O. arctobia		×	×		×	×	×		×					×	×	×		
Mertensia Drummondii			×				×											
Artemisia Richardsoniana	×	×	×				×											
Aster pygmaeus		×	×				×											
Taraxacum hyparcticum	×	×	×			×		×	×			×			×			×
T. pumilum		×	×				×	×			×	×						×
T. phymatocarpum	×	×	×				×	×	×		×	×	×	×	×			×

Western Arctic Endemics

The "Western Arctic endemics" form a not too well-defined group of 10 species forming a link between "Arctic Archipelago endemics" to the north and the "Cordilleran endemics" to the south. A few, such as *Cardamine digitata*, *Juncus balticus* var. *alaskanus*, and *Salix niphoclada*, reach Bering Strait, but their affinity seems to be with the American rather than with the Asiatic flora. The ranges of several members of this group extend eastward across the Mackenzie valley, beyond which few species of Beringian or Asiatic affinity have been able to penetrate. A few even reach the western shore of Hudson Bay. All but one have their northern limits in Banks and Victoria islands. In map fig. 12 is shown the total range of *Kobresia hyperborea*.

Table XIII

Western Arctic endemics (10 species) / Western Arctic radiants	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Kobresia hyperborea	×						×											
Juncus balticus var. *alaskanus*	×	×	×				×											
Salix niphoclada	×	×	×				×											
Papaver Keelei	×	×	×				×											
Cardamine digitata	×	×	×				×											
Oxytropis hyperborea	×	×	×				×											
Phlox Richardsonii	×	×	×				×											
Castilleja pallida ssp. *elegans*	×	×	×				×											
Antennaria compacta	×	×	×				×		?		×							
Artemisia hyperborea	×	×	×				×				×							

Table XIV

Eastern Arctic endemics (16 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Deschampsia pumila												×	×		×	×	×	×
Eriophorum vaginatum ssp. *spissum*						×								×	×	×	×	×
Carex miliaris							×								×	×	×	×
C. saxatilis var. *rhomalea*							×								×	×	×	×
Salix calcicola							×								×	×	×	×
S. cordifolia var. *callicarpaea*							×								×	×	×	×
S. glauca var. *stenolepis*							×								×	×	×	×
S. Uva-Ursi							×								×	×	×	×
Ranunculus Allenii							×								×	×	×	×
Arabis arenicola			×				×		×			×		×	×	×	×	×
Draba Allenii														×	×	×	×	?
Oxytropis Bellii														×	×	×	×	×
O. terrae-novae															×	×	×	×
Castilleja septentrionalis							×								×	×	×	×
Antennaria canescens															×	×	×	×
A. glabrata															×	×	×	×

Eastern Arctic Endemics

The "Eastern Arctic endemics", represented by 16 species, clearly form a northern extension of a much larger group of eastern North American plants, and their affinity obviously is with the amphi-Atlantic group. Their centre of distribution appears to be around the northern Hudson Bay region, southern Baffin Island, and northern Labrador; a good many are found in West Greenland, and four have reached northeast Greenland: *Deschampsia pumila, Carex saxatilis* var. *rhomalea, Arabis arenicola,* and *Antennaria canescens.* In map fig. 13 is shown the arctic range of *Salix Uva-Ursi.*

The Amphi-Beringian Species

Considering that the amphi-Beringian element forms about one-third of the entire flora (Porsild, 1951a) of Alaska and Yukon, it is surprising and perhaps significant that only 15 species of that group have reached the Arctic Archipelago. Here, with one or two exceptions, they are restricted to specialized habitats in the westernmost islands. It may be significant, too, that none of the 15 is truly arctic and that in Alaska and Yukon members of this group are found not only on the north coast but also in the deep interior. In other words, they are plants that in Alaska and Yukon are found mainly in the unglaciated areas: *Carex lugens, Eriophorum vaginatum, Salix alaxensis, S. pseudopolaris, Ranunculus Gmelini, Parrya nudicaulis, Geum Rossii, Androsace Chamaejasme* var. *arctica,* and others.

Table XV

(15 species or 4·6%)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Eriophorum vaginatum	X	X	X				X									X		
Carex lugens	X		X				X											
C. physocarpa	X	X	X				X											
Salix alaxensis	X	X	X				X							X		X		
S. pseudopolaris	X		X				X									X		
Caltha palustris var. *arctica*	X		X		X		X		X									
Ranunculus Gmelini	X		X				X											
Descurainia sophioides	X		X				X											
Parrya nudicaulis	X		X				X											
Geum Rossii	X		X				X		X			X						
Potentilla nivea ssp. *Hookeriana*	X		X				X											
Hedysarum alpinum	X		X				X											
Androsace Chamaejasme var. *arctica*	X		X				X											
Artemisia Tilesii	X						X											
Senecio atropurpureus	X						X											

Clearly there must be a historical reason why so few species of Beringian affinity have reached the Archipelago, because the broad coastal shelf that extends eastward along the north coast of Alaska and Yukon across Beaufort Sea would have afforded an easy communication between "Beringia" and the Arctic Archipelago by an inconsiderable lowering during the Pleistocene of the present sea-level. Presumably an ice-lobe that extended from the Canadian mainland across to the southern islands of the Archipelago prevented the eastward migration of plants in Pleistocene and post-Pleistocene time. In map fig. 14 is shown the arctic range of *Carex lugens*.

The Amphi-Atlantic Species

The amphi-Atlantic group, of which there are 48 species in the flora of the Archipelago, is an eastern counterpart of the amphi-Beringian group in the west. They form a northern extension of a larger group that occupies both sides of the north Atlantic. Many are found in Greenland and Iceland, but few range west much beyond the Hudson Bay region. Those occurring in the Arctic Archipelago may be subdivided into an arctic and a subarctic group. Although in some cases the separation is somewhat arbitrary, each group nevertheless must have had a very different history.

Table XVI

Northern group (17 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Deschampsia brevifolia	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pleuropogon Sabinei	?	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poa abbreviata		X	X	X	X	X		X	X	X	X	X	X	X	X			
P. alpigena var. *colpodea*		X	X															
P. arctica ssp. *caespitans*		X	X															
P. arctica var. *vivipara*		X	X															
P. Hartzii		X	X															
Colpodium Vahlianum		X	X															
Eriophorum triste	X	X	X															
Cerastium Regelii		X	X															
Sagina caespitosa		X	X															
Stellaria crassipes		X	X															
Draba subcapitata		X	X															
Saxifraga flagellaris ssp. *platysepala*		X	X															
Potentilla pulchella	X	X	X															
Epilobium arcticum		X	X															
Pedicularis hirsuta		X	X															

The southern group must have survived the Pleistocene farther south and is now occupying territory once covered by the ice, whereas the northern group is still largely occupying territory that probably was never glaciated. The affinity of a good many of the northern or high-arctic members of this group is with the Arctic Archipelago endemics. An example of this type of distribution is illustrated by map fig. 15, which gives the total range of the high-arctic *Pleuropogon Sabinei*. Map fig. 16 shows the arctic range of the low-arctic *Diapensia lapponica*.

Table XVII

Southern group (31 species)	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia	Mackenzie	Prince Patrick	Melville	Bathurst, Cornwallis	Axel Heiberg	Ellesmere	Devon, etc.	Melville Pen.	Baffin	Keewatin	Labrador-Ungava	Greenland
Deschampsia alpina															×	×	×	×
Poa laxa							×								×		×	×
Carex arctogena						×	×						×	×	×	×	×	×
C. Bigelowii															×			×
C. nardina var. *atriceps*	×		×			×	×				×	×	×	×	×	×	×	×
C. norvegica															×	×	×	×
Juncus arcticus							×								×	×	×	×
J. trifidus															×		×	×
Salix herbacea						×	×						×	×	×	×	×	×
Betula nana															×			×
Cerastium alpinum					×	×	×			×	×	×	×	×	×	×	×	×
C. cerastioides															×		×	×
Sagina nodosa							×								×	×	×	×
Arabis alpina															×		×	×
Draba norvegica															×		×	×
Rhodiola rosea															×		×	×
Saxifraga aizoides		×	×			×	×					×		×	×	×	×	×
S. Aizoon							×								×		×	×
S. caespitosa ssp. *eucaespitosa*						×	×						×	×	×	×	×	×
S. tenuis	×	×						×		×		×	×		×		×	×
Potentilla Crantzii															×		×	×
P. nivea s. str	×						×								×	×	×	×
P. nivea ssp. *Chamissonis*		×	×				×								×	×	×	×
Cassiope hypnoides							×								×	×	×	×
Diapensia lapponica							×							×	×	×	×	×
Armeria maritima ssp. *labradorica*		×	×		×	×	×				×	×	×	×	×	×	×	×
Bartsia alpina															×		×	×
Euphrasia arctica															×		×	×
Pedicularis flammea							×						×	×	×	×	×	×
Plantago juncoides var. *glauca*							×								×		×	×
Taraxacum lapponicum							×								×		×	×

CONCLUSIONS

In Greenland today, glacial conditions must closely resemble those that existed in the Canadian Arctic during the Pleistocene glaciation (Porsild, 1951a); yet we find there a comparatively rich flora of 450-odd species of vascular plants surviving on a narrow coastal fringe varying in breadth from a few miles to 160 miles. The glacial history of Greenland is still imperfectly known, but it is certain that there have been several successive advances and retreats of the ice fronts, resulting in a broadening and narrowing of the ice-free fringe. But everywhere in Greenland, except in the northernmost parts and in certain small nunatak areas in the south thought never to have been glaciated, the coastland of today was heavily glaciated during earlier advances of the ice fronts. And yet the present flora must have survived on that fringe, for there is no geological evidence supporting land connections to Europe or to North America in post-Pleistocene or Pleistocene time. Furthermore, there is no reason to believe that the southern element in the flora of Greenland could have survived on alpine nunataks protruding above the ice, or that the present flora as a whole could have originated in post-glacial time from diaspores carried across the seas by wind, migratory birds, or sea-currents.

As regards the flora of the Canadian Arctic Archipelago, the weight of the botanical evidence presented in the foregoing discussion and summarized below in Table XVIII, appears to support the view that, at any rate, the arctic element in the flora survived Pleistocene glaciation somewhere in the Archipelago. That arctic element probably included all high-arctic and arctic-alpine members of the widely distributed circumpolar plants (Tables VII and VIII), a good half of the North American radiants (Table X), all the endemic groups (Tables XI, XII, XIII, and XIV), and also the amphi-Beringian as well as the arctic elements in the amphi-Atlantic group (Tables XV to XVII). In all, 198 species, or 60 per cent of the present flora, are believed to have survived the Pleistocene glaciation in the Archipelago, and only 40 per cent, or 128 species, which today grows only along the southern perimeter, may have reached the Archipelago in post-glacial time.

Table XVIII. Summary of Distribution

	Alaska-Yukon	Banks	Victoria	Prince of Wales	King William	Boothia Peninsula	Mackenzie	Prince Patrick	Melville	Bathurst, etc.	Axel Heiberg	Ellesmere	Devon, etc.	Melville Peninsula	Baffin	Keewatin	Ungava	Greenland
Widely distributed circumpolar (143 species or 43·9%)—																		
Table VII—High-arctic group (33 species)	32	29	28	3	20	18	30	21	21	20	15	26	26	22	32	28	28	31
Table VIII—Arctic-alpine group (42 species)	42	33	40	2	21	24	42	15	22	20	18	42	35	36	42	42	40	42
Table IX—Low arctic group (68 species)	68	21	34	0	12	10	66	3	3	2	0	4	9	26	63	62	65	58
North American species (N.A. radiants: 58 species or 17·6%; total endemics: 62 species or 19·1%)—																		
Table X—North American radiants (58 species)	54	30	39	4	14	19	55	6	11	9	13	22	20	25	52	37	48	42
Table XI—Cordilleran endemics (10 species)	10	6	7	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Table XII—Arctic Archipelago endemics (26 species)	6	20	17	4	10	9	17	18	12	6	10	18	8	6	10	3	2	15
Table XIII—Western Arctic endemics (10 species)	10	7	8	0	0	0	10	0	1	0	1	0	0	0	0	2	0	0
Table XIV—Eastern Arctic endemics (16 species)	0	0	1	0	0	1	5	0	1	0	0	2	1	4	15	10	15	8
Amphi-Beringian species (15 species or 4·6%)—																		
Table XV	15	11	13	0	1	0	14	0	2	0	0	1	0	1	0	4	0	0
Amphi-Atlantic species (48 species or 14·7%)—																		
Table XVI—Northern group (17 species)	3	11	10	1	5	12	5	7	8	8	7	14	14	11	15	5	8	17
Table XVII—Southern group (31 species)	3	4	4	0	2	6	17	1	0	2	3	6	8	8	31	16	30	31
Totals	243	172	201	14	85	99	271	71	83	67	67	135	121	139	260	209	236	244

Notes on Some Plant Habitats

Owing to the monotonous topography as well as to the uniformly cool and dry climate that characterizes large parts of the Arctic Archipelago, the general aspect and composition of the vegetation show little variation from place to place. Seen from an aeroplane, most of the surface of Banks and Victoria islands appears desolate and almost completely devoid of plant life. Even from comparatively low elevations, it is only by close inspection of an occasional patch of dull greenish brown colour that the presence of vegetation is revealed. Even so, although much of the stony surface, particularly in the areas of rapidly weathering carbonate rocks, is a veritable rocky desert, small areas that from the air looked bleak and desolate may reveal on closer inspection from the ground an astonishing, if local, luxuriance. Some south-facing slopes, watered by melt-water from a residual snowbank, may actually be ablaze with colour for a few short weeks.

Closed vegetation is nowhere extensive and is often restricted to south-facing slopes, and particularly such where moisture is available throughout the growing season.

Simmons (1906) noted that in Ellesmere Island differences in elevation made comparatively little difference to plant growth in the sense that the same species often grew at sea-level as well as at higher elevations. In Axel Heiberg Island the writer found the most luxuriant vegetation at elevations between 2,000 and 2,400 feet (600 to 720 m.), and the vegetation at still higher elevations very sparse. Too little information is as yet available to determine whether or not this condition is general throughout the Arctic Archipelago. Certainly, occasional air temperatures, read from an aeroplane over Banks and Victoria islands, from late July to late August, 1949, suggest that there is little difference between the air temperature at ground level and at elevations between 2,000 and 4,000 feet (600 to 1,200 m.). In fact, on certain days a temperature inversion was noted, as when the air temperature over Sachs Harbour, Banks Island, at 1:20 p.m. on July 30 was 46° F. (7·8° C.) at 4,200 feet (1,260 m.) but dropped to 40° F. (4·4° C.) on landing.

In the catalogue appearing at the conclusion of this report I have given brief notes on the ecology of most species. In the following notes on the vegetation of Banks and Victoria islands I have attempted to describe in a general way (*a*) some of the most common and widespread vegetation types, and (*b*) some specialized plant habitats, particularly those of eutrophic soils, as well as those soils that are greatly affected by present-day geomorphic processes, such as solifluction and congeliturbation.

Tundra Soils

Closed vegetation is most commonly found in rather wet ground, in damp swales, and in turfy places along lake shores and lake margins. Some fairly extensive areas with closed vegetation were noted in central Banks Island and in central eastern Victoria Island.

Such wet tundra is hummocky, but at present is feebly or not at all disturbed by frost heaving. Polygon patterns are rarely discernible from the ground, but from the air are clearly visible and often of striking size

and irregularity, often rectangular in outline. In 1949, permafrost was generally found at a depth of about 10 inches (25 cm.). Some, or all, of the following species are common in such wet tundra:

On the hummocks and on turfy ridges grow *Arctagrostis latifolia, Hierochloe pauciflora, Carex atrofusca, C. misandra, C. membranacea* and *C. stans, Eriophorum triste, Salix arctica, S. reticulata* and *S. Richardsonii, Oxyria digyna, Polygonum viviparum, Arenaria Rossii, Silene acaulis, Stellaria longipes, s. lat., Draba Bellii,* and *D. lactea, Eutrema Edwardsii,* (nearly always growing on the sides of hummocks), *Braya purpurascens, Parrya arctica, Saxifraga oppositifolia, Dryas integrifolia, Arctostaphylos alpina* (rare), *Androsace Chamaejasme* var. *arctica, Pedicularis arctica, P. capitata* and *P. lanata, Chrysanthemum integrifolium, Petasites frigidus,* and *Senecio atropurpureus.*

In wet places between the hummocks we find *Equisetum variegatum, Alopecurus alpinus, Dupontia Fisheri, Arctophila fulva* (always sterile when present), *Eriophorum Scheuchzeri, Juncus biglumis, Melandrium apetalum* ssp. *arcticum, Ranunculus hyperboreus, Saxifraga cernua* and *S. Hirculus,* and *Pedicularis sudetica.*

Stony Barrens

Windswept, stony clay flats on low, flat-topped domes of rolling hills, or extensive flat-lying terraces, are common features of the low foreland, the shelving beaches, and the low interior plateaux of Banks and Victoria islands. Soil stripes and local polygon patterns are frequently discernible, but the processes by which they were formed no longer appear very active. In northern Banks Island, on August 13, 1949, permafrost was found in such soils at an average depth of 38 inches (96·5 cm.).

Four species, *Kobresia myosuroides, Dryas integrifolia, Potentilla rubricaulis,* and *Oxytropis arctica,* are truly ubiquitous on such flats; they are without doubt the most common plants in Banks and Victoria islands and may be found in varying abundance in all but the wettest plant habitats. Commonly growing with them are *Festuca baffinensis, Carex scirpoidea* and *C. rupestris, Salix arctica* and *S. reticulata, Polygonum viviparum, Arenaria rubella, Stellaria longipes, s. lat., Braya purpurascens, Draba Bellii* and *D. subcapitata, Parrya arctica, Papaver radicatum, Saxifraga aizoides* and *S. oppositifolia, Potentilla Vahliana, Oxytropis arctobia, Pedicularis arctica, P. capitata* and *P. lanata, Chrysanthemum integrifolium,* and *Taraxacum phymatocarpum.*

For a few short weeks each season the showy purple and yellow flowers of the *Oxytropis,* the *Potentillae,* and the *Papaver* transform these otherwise monotonous and dreary flats into variegated and incredibly beautiful patterns of colour.

On the rocky crests of hills, often growing in small gullies, or in the shelter of large boulders that break the wind and cause the formation of protecting snowdrifts in winter, the following species were commonly recorded: *Deschampsia brevifolia, Festuca baffinensis* and *F. brachyphylla, Poa abbreviata* and *P. glauca, Kobresia myosuroides, Carex rupestris, Luzula confusa, Salix arctica, Polygonum viviparum, Oxyria digyna, Arenaria rubella, Stellaria longipes, s. lat., Papaver radicatum, Erysimum Pallasii, Draba Bellii, D. cinerea, D. nivalis* and *D. subcapitata, Lesquerella arctica, Saxifraga oppositifolia, S. tricuspidata* and *S. cernua* (the last often in

shade among boulders), *Dryas integrifolia*, *Potentilla rubricaulis* and *P. Vahliana*, *Oxytropis arctica* and *O. arctobia*, *Androsace Chamaejasme* var. *arctica* and *A. septentrionalis*, *Pedicularis capitata*, *Erigeron compositus*, and *Taraxacum phymatocarpum*.

EUTROPHIC PLANT HABITATS

As most arctic soils are oligotrophic, the effect of plant nutrients derived from animal dung, or from other organic sources, is always striking in the arctic landscape, where the vegetation is everywhere sparse, dwarfed, and starved. Because of the low soil temperatures, the dry climate, and the short summer, bacterial action and decay are extremely slow, and the fertilizing effect of animal dung or of animal carcasses or skeletons continues for a very considerable time.

It is well known, for example, that Eskimo house sites, even where such are known to be several hundred years old, can commonly be recognized in summer by the fresh green vegetation covering the ruins. Likewise, whale skeletons on emerged strandlines in the Canadian Arctic Archipelago, which must be centuries or even milleniums old in view of their considerable elevation above present sea-level, continue to enrich the soil as shown by the vegetation, which is always decidedly richer and greener near the buried whale skeletons.

In Mercy Bay, on the north shore of Banks Island, musk-ox dung that still held its original shape and texture must have been several years old because large grass seedlings had rooted in the dung.

Even small quantities of manure can have a considerable effect on arctic vegetation. Thus, while stationed in Greenland during the last war, I had occasion to visit Disko. One day when botanizing in the vicinity of the Arctic Station at Godhavn, I came upon a place where, as a small boy, I had somewhat hopefully planned a "botanic garden". The project, as I remembered, had not progressed very far, but the outline of the projected "garden" could still be seen. Close by, in the middle of an otherwise undisturbed *Vaccinium uliginosum* heath, I noticed a patch of green grass about 10 feet in diameter, the origin of which puzzled me, until I recalled that this was the very spot where, 34 years ago, I had accidentally spilled a wheelbarrow-load of goat manure from the stable where my father kept milch goats. The manure had been destined for the "botanic garden", and I had undoubtedly endeavoured to salvage as much as possible of the spilled manure. Yet the effect of that manure was still visible in the lush growth of grasses among which could even be seen the long-dead stems of the original *Vaccinium* plants and also some of the goat pellets.

In the Arctic Archipelago, eutrophic plant habitats are not extensive, but because of their striking effect upon the vegetation and on the bleak arctic landscape, they are nevertheless of considerable interest. Some such eutrophic plant habitats that have come to my notice are described here briefly (Compare also Scholander, l.c., 1934, pp. 124-130).

Owl Perches

In Banks and Victoria islands, small green domes or hillocks are common on level or gently sloping tundra. They are seldom more than a foot or two high, often concentric in outline, and because of their lush

and green vegetation stand out as tiny "oases" in the otherwise desolate landscape. These hillocks have usually formed in the lee of a protruding rock, on which generations of snowy owls have perched on the look-out for lemmings (Plate VII, fig. a). Often a dozen or more such hillocks may be seen from one point of vantage. Often they are "strategically" chosen along the upper rim overlooking a small gully or a hillside. Because of the fertilizing effect of the owl droppings and pellets, a thick turf or sward has formed around the base of the rock on which the owls perch. This turf is composed partly of vegetable matter and partly of masses of lemming skulls and bones, with the occasional skull or bone of a small passerine bird or of a ptarmigan. The lush vegetation resulting from the enriched soil again attracts lemmings, who make tunnels and burrows through the turf and are finally eaten by the owls; ptarmigans and arctic hares come to feed on the seeds or stems of plants that in winter protrude above the snow. The droppings of all these animals in turn help to fertilize the plants growing on the owl hillock.

These tiny "oases", of which in some parts of Banks and Victoria islands there must be hundreds to the square mile, harbour an interesting micro-flora composed of species of which some are ubiquitous, whereas some, at least in northern Banks Island, are rarely seen except on owl perches: *Deschampsia brevifolia, Colpodium Vahlianum, Puccinellia angustata, Poa alpigena* var. *colpodea, Poa glauca, Festuca baffinensis, Luzula confusa, Arenaria rubella, Melandrium affine, Ranunculus Sabinei, R. pedatifidus, Erysimum Pallasii, Cochlearia officinalis* ssp. *arctica, Draba subcapitata, Potentilla pulchella, Astragalus alpinus, Arnica alpina* ssp. *angustifolia, Taraxacum lacerum*, and *T. phymatocarpum*. Some of these are facultative coprophilous species; others originate from seeds accidentally and unintentionally "planted" by the lemmings or birds devoured by the owls. The example serves to illustrate one form of step-by-step migration of plants by endozoic dispersal of seeds.

Animal Burrows

The dens of wolves and foxes, like the owl perches, may always be identified from afar by a lush growth of grasses and weedy non-grasslike plants, often of a coarser type than those commonly found on owl perches. On fox dens near Cape Kellett on Banks Island, a lush growth of *Alopecurus alpinus, Arctagrostis latifolia,* and *Polemonium boreale* was noted.

Bird Cliffs and Nesting Sites

Still another type of eutrophic ornithocoprous plant habitat is commonly found below cliffs on which seagulls or falcons nest. Even a lone nesting site of a gyrfalcon or peregrine falcon may be spotted from a distance by the white blotches or stripes of bird dung and by the abundant growth of the red lichen *Caloplaca elegans,* which in time forms on the face of the cliff below the nest, and by the lush, green vegetation on the scree below the cliff. Such nesting sites are invariably located on south-facing cliffs, and the scree below, because of the favourable exposure, is free from snow earlier than the level ground is.

On one such scree below a peregrine falcon's nest in Victoria Island grew thick mats composed of *Saxifraga tricuspidata* and *S. caespitosa* ssp. *uniflora*, *Dryas integrifolia*, *Stellaria longipes s. lat.*, *Draba cinerea*, *Potentilla nivea* ssp. *Chamissonis*, and *P. rubricaulis*; in the mat grew tufts of *Luzula confusa*, *Ranunculus pedatifidus*, *Saxifraga cernua*, and *Cystopteris fragilis*.

By far the richest vegetation noted anywhere in the Arctic Archipelago was found near Cape Lambton on Banks Island, on a south-facing scree below a cliff where a colony of herring gulls and a pair of peregrine falcons nested in apparent harmony (Plates III, B; IV, A). In the rich flower mats on the scree grew luxuriant *Dryopteris fragrans* and *Cystopteris fragilis*, *Agropyron latiglume*, *Trisetum spicatum*, and *Poa glauca*; small thickets of *Salix Richardsonii*, 2 feet tall; *Oxyria digyna*, *Arenaria sajanensis*, *Stellaria longipes s. lat.*, *Ranunculus pedatifidus*, *Anemone parviflora*, yellow- and white-flowered *Papaver radicatum*, *Draba cinerea*, *Cochlearia officinalis* ssp. *arctica*, *Saxifraga tricuspidata*, tall and rich-flowering tufts of *Potentilla rubricaulis*, the tiny but large-flowered *Gentiana arctophila*, *Polemonium boreale*, *Castilleja pallida* ssp. *elegans*, *Pedicularis capitata*, *Campanula uniflora* (very rare elsewhere in the western islands), *Erigeron compositus*, *Arnica alpina* ssp. *angustifolia*, and giant tufts of the tall and handsome, creamy flowered *Taraxacum hyparcticum*. The cliff itself and all exposed rocks in the scree were covered by thick crusts of lichens, mainly *Caloplaca elegans* and species of *Gyrophora*.

Musk-ox Meadows

In Axel Heiberg Island, by far the richest vegetation was seen at elevations of between 2,000 and 2,200 feet (600 to 700 m.), on a 10-mile-wide highland bordering the central ice-cap west of the head of Mokka Fjord. This highland, by deeply eroded canyons, is cut into mesa-like plateaux and because of its proximity to the ice-cap probably receives more precipitation than do the very arid eastern parts of the island. While part of the plateaux are stony and comparatively barren, the extensive flats and swales at the head of the incipient drainage patterns that extend back from the canyons support a surprisingly rich vegetation that can best be described as truly meadow-like. A herd of 11 musk-oxen was seen grazing on one of these plateaux, which, judging from the abundance of fresh and old dung as well as from other signs, appeared to be one of the favourite summer grazing grounds of the island's musk-ox population. Several skulls and remains of skeletons, some fairly fresh and some very old, were noted in the course of two traverses on foot across the plateau. Although no tests could be made for the nitrogen and phosphate content of the soil, there can be little doubt that the luxuriance of these meadows are, at least in part, due to the musk-oxen.

Goose Meadows and Goose Nesting Sites

Several species of geese and two of eider duck nest in considerable numbers in various parts of the Arctic Archipelago, and whistling swans and sandhill cranes breed in Banks Island at least. The proximity of the nesting sites of these birds, as well as of the meadows and lake shores where the geese feed, by the lush growth of the vegetation, bears evidence of the fertilizing effect of the droppings of these birds. In Axel Heiberg Island, snow geese nested in a number of places back of

our base camp on a large lake at the head of Mokka Fjord. Abandoned nests and numerous signs of feeding, besides abundant goose droppings, were noted, especially along brooks in small valleys, often at some distance from the lake. The geese had been feeding mainly on *Oxyria digyna*, *Epilobium latifolium*, and on a very luxuriant form of *Deschampsia brevifolia*.

Strand Vegetation

Strand vegetation everywhere is feebly developed in the Arctic Archipelago. In Banks and Victoria islands, owing to the effect of ice-shove along the often shelving shores, well-developed strand vegetation is absent except in well-protected coves and inlets. The few obligate littoral species that in the Archipelago are widely distributed are *Puccinellia Andersonii*, *P. phryganodes*, *Carex maritima*, *C. ursina*, *Stellaria humifusa* and *Cochlearia officinalis* ssp. *arctica*, while *Elymus arenarius* ssp. *mollis*, *Carex subspathacea*, *C. glareosa* var. *amphigena*, *Arenaria peploides* var. *diffusa*, *Ranunculus Cymbalaria*, *Potentilla Egedii* var. *groenlandica*, *Lomatogonium rotatum*, *Mertensia maritima* and *Matricaria ambigua* in the Archipelago are restricted to the southern parts, where few of them are common.

One of the few well-developed strandflats noted in Banks or Victoria islands was seen near the head of Minto Inlet. In moist swales between a series of emerged strandlines paralleling the shore grew *Equisetum variegatum*, *Puccinellia phryganodes*, *Eriophorum Scheuchzeri*, *Juncus biglumis*, *Melandrium apetalum* ssp. *arcticum*, *Cochlearia officinalis* ssp. *arctica*, and *Epilobium arcticum*, and on the higher ground grew *Elymus arenarius* ssp. *mollis*, *Arenaria peploides* var. *diffusa*, *Papaver radicatum*, *Saxifraga caespitosa* ssp. *uniflora*, *Potentilla pulchella*, *Astragalus alpinus*, *Armeria maritima* ssp. *labradorica*, and *Pedicularis arctica*.

Lakes and Ponds

Only nine obligate aquatic plants thus far have been discovered in the Arctic Archipelago, where all are rare and restricted to small, eutrophic, and shallow ponds that owing to shelter and a favourable exposure become free from ice early. Of the five species known from the western islands, *Pleuropogon Sabinei* and *Ranunculus hyperboreus* range north beyond the 80th parallel, whereas *Arctophila fulva*, *Ranunculus Gmelini*, and *Hippuris vulgaris* thus far have been reported only from the southern parts of the Archipelago.

Snowbed Vegetation

Snowbed communities are feebly developed in the Arctic Archipelago. A number of obligate snowbed plants belong in the amphi-Atlantic groups and succeed in the oceanic climate of the Eastern Arctic but in the arid, continental climate of the central and western islands do not find suitable habitats. A few snowbed communities were seen in Banks and Victoria islands, chiefly along brooks flowing from large residual snowbanks, which in those islands form in the lee of large escarpments and cliffs of the trap-sedimentary series. In such a place, near the head of Minto Inlet, a snowbed community was composed of *Equisetum arvense*, *Carex stans*, *Eriophorum triste*, *Carex membranacea*, *Juncus albescens*,

Luzula nivalis, Salix reticulata, Oxyria digyna, Cerastium Beeringianum, Cardamine digitata, Ranunculus nivalis, Saxifraga cernua, S. Hirculus, and *Epilobium latifolium.*

A very different type of snowbed habitat was noted chiefly in northern Banks Island in damp swales in tundra and on shelving lake shores protected from ice-shove. These habitats are among the last to become free from snow; as a result, several species growing there depend mainly on vegetative reproduction. In one such habitat near Russell Point, *Salix pseudopolaris,* growing with its stems buried in a mat of mosses in the manner of *Salix herbacea,* and sterile *Cerastium Regelii* were the dominant species, while *Equisetum variegatum, Alopecurus alpinus, Arenaria Rossii, Melandrium apetalum* ssp. *arcticum, Caltha palustris* var. *arctica, Ranunculus hyperboreus, Saxifraga Hirculus, S. cernua, Potentilla hyparctica,* and *Pedicularis sudetica* were more or less incidental.

Snow Patch Vegetation

In the high-arctic landscape, snow cover is a necessity to plants as a protection from dessication and as a source of water during the latter part of the growing season for a number of species that in the Arctic Archipelago otherwise succeed only in slight depressions in the landscape or in the lee of protruding obstacles where not too deep snowdrifts form in winter. The plants growing in such places are not snowbed plants and require the full length of the short growing season. In the Archipelago all species with woody aerial stems are confined to snow patch habitats. Some other species that are often associated with them on snow patch habitats are *Carex scirpoidea, C. misandra, Luzula nivalis, Oxyria digyna, Potentilla hyparctica, Pyrola grandiflora, Pedicularis arctica, P. capitata,* and *P. lanata,* and in the western islands often also *Parrya arctica* and *Oxytropis arctica* and *O. Maydelliana.* In the western islands *Cassiope tetragona* and *Vaccinium uliginosum* may occasionally form small patches of closed heath, and in one or two places I have seen small thickets of *Salix alaxensis* and *S. Richardsonii.*

Vegetation of Patterned Ground

It is evident that some species are not so unfavourably affected by solifluction and congeliturbation processes as are others (*See* Geomorphic processes affecting plant growth, p. 12).

It is also apparent that the shape of the sub-aerial parts of the plants largely determines whether or not soil movement is detrimental to their growth; thus plants with extensive, creeping rhizomes or stems are particularly unsuited and vulnerable, whereas tufted species, or those with a moderately developed tap-root, suffer comparatively little damage. While downhill wasting and soil creep may dislodge and transport growing plants, thereby causing the familiar striped or sometimes festooned patterns on gentle slopes, the plants growing on solifluction sheets and lobes appear to suffer less injury from the soil movement than do those growing on non-moving but actively congeliturbated patterned ground.

In northeast Greenland, Seidenfaden (1931) noted that even those plants that are most resistant to soil movement rarely flower "because the plants have enough to do in attempting to keep to the surface of the soil". In other words, the plants growing on moving soil are in constant danger

of being "drowned" or smothered when, in spring, parts of their root system are still firmly anchored in frozen ground. For this reason their growth is largely vegetative, as shown by the buried and often elongated caudices so commonly seen in plants growing on moving or wind-deposited soil. The conditional sterility of plants growing on moving soil is, perhaps, more apparent in the somewhat moister climate of northeast Greenland where the snow cover is greater than in the arid Canadian Arctic Archipelago. Certainly the slope shown in Seidenfaden's figure 1 suggests a rather late habitat. Seidenfaden (p. 5) lists 14 species that on Clavering Island, in latitude 74° 17′, grew on what presumably is representative of the locally typical solifluction slope. Except for *Cassiope tetragona*, which heads the list, and *Vaccinium uliginosum*, all could be found on solifluction slopes in comparable latitudes in Banks and Victoria islands.

Whatever effect the two different processes of soil movement may have on plants, those species commonly growing on such soils, and presumably most resistant to soil movement, in Banks and Victoria islands are as follows: *Dryas integrifolia*, *Kobresia myosuroides*, and *Salix arctica*. With these are not infrequently found *Festuca brachyphylla*, *Carex misandra*, *Polygonum viviparum*, *Melandrium apetalum* ssp. *arcticum*, *Stellaria longipes*, *Arenaria Rossii*, *Braya purpurascens*, *Parrya arctica*, *Draba Bellii*, *D. lactea*, *Lesquerella arctica*, *Saxifraga oppositifolia*, *Potentilla rubricaulis*, *P. Vahliana*, *Oxytropis arctica*, *O. arctobia*, *Pedicularis arctica* and *P. lanata*, *Chrysanthemum integrifolium*, and *Taraxacum phymatocarpum*.

CATALOGUE OF THE VASCULAR FLORA OF THE WESTERN ISLANDS

In the catalogue, 234 species or races of plants having well-defined geographical ranges are listed as indigenous to the islands of the Western Canadian Arctic. Of this number no less than 78 are first records, whereas the following 38 species are "new" to the flora of the entire Arctic Archipelago.

Calamagrostis chordorrhiza
Festuca rubra var. *arenaria*
Hierochloe odorata
Poa alpigena var. *colpodea*
Puccinellia agrostidea
P. Andersonii
P. Bruggemanni
P. poacea
Kobresia hyperborea
Eriophorum triste
Carex lugens
C. petricosa
C. physocarpa
Juncus balticus var. *alaskanus*
Salix niphoclada
S. pseudopolaris
Cerastium arcticum
Melandrium Ostenfeldii
Ranunculus Cymbalaria var. *alpinus*
R. Gmelini
Pulsatilla ludoviciana
Papaver Keelei
Braya humilis ssp. *arctica*
B. Thorild-Wulffii
Descurainia sophioides
Potentilla nivea ssp. *Chamissonis*
Astragalus Richardsonii
Oxytropis glutinosa
Pyrola secunda var. *obtusata*
Arctostaphylos rubra
Primula stricta
Lomatogonium rotatum
Gentiana arctophila
Artemisia hyperborea
A. Richardsoniana
A. Tilesii
Erigeron grandiflorus
Senecio hyperborealis

Some, or all, of the following 63 species are likely to be discovered in the southern parts of the western islands. Those marked with an asterisk are now known to occur in the islands of the Eastern Arctic. An interrogation mark denotes that the species is an obligate oxylophyte and therefore not likely to be found except on the acid Precambrian rocks of Boothia Peninsula.

**Woodsia alpina*
**W. ilvensis* (?)
**Lycopodium annotinum* (?)
Sparganium hyperboreum
**Potamogeton filiformis*
**Agrostis borealis*
Bromus Pumpellianus var. *arcticus*
**Calamagrostis canadensis* var. *Langsdorffii*
**Deschampsia pumila*
**Poa alpigena* s. str.
**Puccinellia Langeana* var. *typica*
**Eriophorum angustifolium*
**E. brachyantherum*
**Scirpus caespitosus* ssp. *austriacus*
**Carex bicolor*
C. consimilis
**C. gynocrates*
**C. holostoma*
**C. Lachenalii*
**C. microglochin*
**C. norvegica*
C. obtusa
**C. supina* ssp. *spaniocarpa*
C. Williamsii
Luzula groenlandica
L. multiflora ssp. *frigida* var. *contracta*
**L. Wahlenbergii*
Zygadenus elegans
Habenaria obtusata
**Salix herbacea*
S. pulchra
**Koenigia islandica*
Rumex arcticus
**Arenaria uliginosa*
**Sagina caespitosa*
**Stellaria crassipes*
**Ranunculus lapponicus*
R. reptans
**R. trichophyllus* var. *eradicatus*
Papaver alaskanum
Erysimum inconspicuum
**Halimolobus mollis*
**Parnassia Kotzebuei*
P. palustris var. *neogaea*
**Oxytropis foliolosa*
Callitriche verna
**Epilobium angustifolium* var. *intermedium*
E. palustre
**Myriophyllum exalbescens*
**Loiseleuria procumbens*
**Diapensia lapponica*
Primula egaliksensis
Gentiana propinqua
**Pedicularis flammea*
**P. hirsuta*
**P. labradorica*
**P. lapponica*
**Pinguicula vulgaris*
Achillea nigrescens
**Antennaria Ekmaniana*
A. subcanescens
Saussurea integrifolia
Senecio lugens

Throughout the catalogue Simmons (1913) is first point of reference for all species recorded by him from the western islands. In cases of changed nomenclature, the binomial used by Simmons is given in synonymy. Otherwise, references to pertinent literature or synonyms are given only when essential to the understanding of the identity and taxonomic position of the species.

For each species listed in the catalogue are cited, first, all the specimens known to me from the western islands and, in case of rare or critical species, also specimens from other parts of the Archipelago. An exclamation mark after a specimen cited, *thus* (Kew!) denotes that the specimen has been verified by the writer in the Herbarium of the Royal Botanic Gardens at Kew.

Following the local distribution are given brief notes on the ecology of the species and, when needed, a discussion of its taxonomy and distribution. At the end is given a statement of the general range of each species.

Unless otherwise stated the specimens cited in the catalogue are in the Herbarium of the National Museum of Canada, Ottawa. For specimens that have been seen elsewhere, the official abbreviation of the herbarium in question is given. Where no collector's name is given, the specimen was collected by the author.

In the catalogue the families and genera are arranged essentially according to Dalla Torre et Harms, *Genera Siphonogamarum* (1907). Within the genera, the species, for the sake of convenience, are arranged alphabetically, except in the genus *Carex* where the arrangement followed is that of Mackenzie in *North America Flora* 18 (1935).

Among the 234 species listed in the catalogue as indigenous to the Western Archipelago are three that are new to Science: *Puccinellia agrostidea* Th. Sør., *P. Bruggemanni* Th. Sør., and *P. poacea* Th. Sør. The following combinations are new: *Saxifraga caespitosa* ssp. *uniflora* n. comb., *Armeria maritima* ssp. *interior* (Raup) n. comb., and *A. maritima* ssp. *californica* (Boiss.) n. comb., *Parrya arctica* forma *albiflora* n. forma, and *Lomatogonium rotatum* ssp. *tenuifolium* (Griseb.) n. comb. (*Pleurogyne rotata* var. *tenuifolia* Griseb. in Gen. et Sp. Gent. 309, 1839).

POLYPODIACEAE

Woodsia glabella R. Br.

Banks Island: Cape Lambton, No. 17533. Victoria Island: Walker Bay, No. 17480; head of Minto Inlet, No. 17352; Holman Island Post, Nos. 17232-3. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Not uncommon on moist ledges and screes of the trap-sedimentary series of western Victoria and southern Banks islands. East of that formation, it was noted but once, growing with *Cystopteris fragilis* on the rocky walls of the canyon of a small river flowing from the north into the head of Prince Albert Sound.

Arctic Am. Range: From Alaska across to E. Greenland. In Ellesmere Island north to 79° N.

Cystopteris fragilis (L.) Bernh.—Simmons, 1913, p. 39; Macoun & Holm, 1921, p. 7.

Banks Island: Noted as common at Cape Lambton on ledges and screes below a nesting colony of herring gulls. Victoria Island: Walker Bay, No. 17479; Minto Inlet, Anderson (Kew!); head of Minto Inlet, No. 17351; Holman Island Post, No. 17230. Noted also in rock canyon of river flowing into Prince Albert Sound and on outcrop of trap-rock east of Washburn Lake. Also from King William Island.

Apparently common in rock crevices and on gravelly screes of the trap-sedimentary series.

Arctic Am. Range: From Alaska across to E. Greenland. In Ellesmere north to lat. 83° N.

Dryopteris fragrans (L.) Schott.

Banks Island: Cape Lambton, growing in dense masses with *Arnica alpina* and *Taraxacum hyparcticum* on scree below cliff, on which nested a colony of gulls. Victoria Island: Common locally on a dry sunny slope near Holman Island Post, No. 17231, but not noted elsewhere.

Arctic Am. Range: From Alaska across to W. Greenland, with a single station in E. Greenland (70° 56′). In the eastern islands and in W. Greenland north almost to lat. 80°.

EQUISETACEAE

Equisetum arvense L.—Simmons, 1913, p. 40.

Banks Island: De Salis Bay, Manning and Macpherson, No. 56; Nelson Head, *iidem*, No. 79; noted by the writer from Cape Lambton, Sachs Harbour, Bernard Island and Mercy Bay. Collected at Baring Land, M'Clure and Ballast Beach, Miertsching (Kew!). Victoria Island: Noted at Walker Bay, Holman Post, and Minto Inlet. Axel Heiberg Island: No. 18618.

Noted as common everywhere on the trap-sedimentary rocks of the northwest and north coasts and Banks Island but apparently scarce or absent on the east and south shores. On Victoria Island, it was common likewise in the western rocky parts but was not seen east of Minto Inlet. Thus far not recorded from the central parts of the Archipelago.

Arctic Am. Range: From Alaska across to E. Greenland. In Ellesmere Island and Greenland north to lat. 80°.

Equisetum scirpoides Michx.

Banks Island: Nelson Head, No. 17778; Storkerson Bay, Manning and Macpherson, No. 115.

Apparently scarce and local. In the Arctic Archipelago otherwise known only from two collections from southern Baffin Island.

Arctic Am. Range: On the mainland from Alaska across to Labrador. In W. Greenland north to lat. 70°. Lacking in E. Greenland, but known from Spitsbergen and Novaya Zemlya.

Equisetum variegatum Schleich.—Simmons, 1913, p. 40.

Banks Island: Bernard Island, No. 17740; noted at Sachs Harbour and Russell Point. Victoria Island: Holman Island Post, No. 17796. Noted at head of Minto Inlet; head of Prince Albert Sound and Tahoe Lake. Prince Patrick Island: Mould Bay, MacDonald, No. 53. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common to occasional, on calcareous sand and clay but not infrequently in moss by brooks. In the western part of the Archipelago previously known only from King William Island.

Arctic Am. Range: From Alaska across to E. Greenland. In Greenland and Ellesmere Island north almost to lat. 80°.

LYCOPODIACEAE

Lycopodium Selago L.

Victoria Island: Rare in damp mossy crevices of rock, Holman Post, Nos. 17234-5. Thus far not recorded from elsewhere in the western Archipelago.

Arctic Am. Range: From Alaska across to E. Greenland. In the eastern Canadian Arctic and Greenland north almost to lat. 80°.

GRAMINEAE

Hierochloe alpina (Sw.) R. & S.—Simmons, 1913, p. 42.

Victoria Island: South coast, Rae (Kew!). Melville Island: Ross, Sabine (Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Although assiduously searched for, I failed to discover this species anywhere in Banks and Victoria islands. This is strange, because *Hierochloe alpina* is very common on the mainland as well as in the islands of the eastern Arctic where it ranges far beyond the 80th parallel.

Arctic Am. Range: From Alaska to E. and W. Greenland, extending north beyond lat. 80° N.

Hierochloe odorata (L.) Wahlenb.

Victoria Island: Rare on a gravelly beach above the highest tide-mark near Holman Post, No. 17240.

The present collection is the first from the Archipelago and represents a very considerable and unexpected extension of the known range of this boreal rather than arctic species, which in Mackenzie District is not known to extend beyond the tree-line. Its nearest known stations are in northern Yukon and on Great Bear Lake. Our specimens had only reached anthesis on August 8 and probably would not have matured fruits.

Arctic Am. Range: From Alaska across to Ungava and the Labrador coast. Not known from the eastern arctic islands nor from Greenland.

Hierochloe pauciflora R. Br.—Simmons, 1913, p. 43.

Banks Island: Cape Lambton, No. 17538; Russell Point, No. 17649; noted at De Salis Bay, Bernard Island, and Mercy Bay. Victoria Island: Wollaston Peninsula; Holman Post; Prince Albert Sound, No. 17432; Minto Inlet (also Anderson, Kew!); Cambridge Bay, No. 17462. Prince Patrick Island: MacDonald, No. 62. Also in Melville and King William islands. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.)

Occasional to common in wet tundra. Throughout its circumpolar range, *H. pauciflora*, although not truly littoral, appears nevertheless to be more or less restricted to the sea-coast and to lowland stations.

Arctic Am. Range: From Alaska across to northern Hudson Bay and the eastern arctic islands. Thus far not recorded from Greenland.

Alopecurus alpinus Sm.—Simmons, 1913, p. 43; Macoun & Holm, 1921, p. 7.

Banks Island: Cape Lambton, No. 17535; north shore (M'Clure, Kew!); Mercy Bay, Manning and Sparrow, No. 190; Cape Crozier, Manning and Macpherson, No. 143a; Russell Point, No. 17644. Also noted at De Salis Bay, Nelson Head, Sachs Harbour, and Bernard Harbour. Victoria Island: Read Island, No. 17186; noted at Wollaston Peninsula, Holman Post, Minto Inlet, head of Prince Albert Sound, and collected at Cambridge Bay by Anderson (Kew!) and at DeHaven Point by J. Bernard. Prince Patrick Island: Mould Bay, MacDonald, Nos. 54 and 55. Isachsen Island: Heywood, No. 1. Prince of Wales Island: Fortier, Nos. 34 and 69. Bathurst Island: Jenness, No. 2. Melville Island: Jenness, No. 30. King William Island: Larsen, No. 4. Axel Heiberg Island: No. 18621.

Probably common in wet tundra throughout the Archipelago; rarely absent, if ever, on owl perches.

Arctic Am. Range: From Alaska over to E. and W. Greenland, north to lat. 83° 39′.

Phippsia algida (Sol.) R. Br., Chloris Melvilliana, p. 27 (1823).
Catabrosa algida, Simmons, 1913, p. 47.

(Plate XII, figures 1 and 2)

Banks Island: Nelson Head, Manning and Macpherson, No. 106; Russell Point, No. 17826; north shore, M'Clure (Kew!); noted at Mercy Bay. Victoria Island: Head of Prince Albert Sound, No. 17433; noted as common near Holman Post; head of Minto Inlet, No. 17359. Prince Patrick Island: Mould Bay, MacDonald, Nos. 63 and 64. Melville Island (Kew!).

Phippsia algida apparently is not uncommon in the western islands where it commonly grows in wet spots on flat clay barrens, often along the solifluction cracks in frost-heaved soil. It is strongly nitrophilous and in moist and heavily manured places becomes 10 to 15 cm. tall.

In view of Hultén's recent report of *P. concinna* from St. Lawrence Island (Fl. Alas. and Yukon, p. 1705), where Kjellman collected it together with typical *P. algida*, the writer has examined the material of North American *Phippsia* in the National Herbarium of Canada. The examination disclosed that all specimens from the westernmost islands, and also several from the north coast of Alaska, together with a recent and only collection from the Mackenzie District: Anderson River, 30 miles above the Delta, Porsild, No. 16776, approach *P. concinna* in having purple-tinged panicle, one stamen, and the fruit predominantly broader below the middle. Otherwise the specimens look like typical *P. algida* and have well-developed glumes and the lemmas glabrous or nearly glabrous.

In the Eastern Canadian Arctic, *P. algida* shows even greater variations. Thus specimens from Craig Harbour, Ellesmere Island (Malte, CAN, Nos. 118845 and 118847), and from Arctic Bay and Clyde on Baffin Island (Malte, CAN, Nos. 118844 and 118849) have somewhat hairy lemmas, one stamen, and fruits that are broader below the middle, whereas the specimens in a very remarkable series from Craig Harbour (Malte, CAN, Nos. 118472, 118836, 118837, 118851, and 118852) average 15 to 20 cm.

in height, with 5 cm. long and 1·5 cm. broad panicle of mostly 2-flowered spikelets in which the glumes are firm and persistent, and the lemmas mostly long-hirsute on the veins. Most flowers in this series have 3 stamens, whereas a few have only one or two. The anthers are well-formed, about ·75 mm. long, but contain no pollen, and the ovaries appear to be atrophic.

At Craig Harbour, Malte on the same day collected typical *P. algida*, which on August 2, 1927, had almost mature fruits. Tab. X, figs. 1 and 2, shows the tall 2-flowered plant from Craig Harbour that Malte (in herb.) named *P. algida* f. *vestita* Holmb.; in which Polunin (1940) has followed him. In view of its giant size, but particularly in view of its totally sterile, 2-flowered spikelets, one might well suspect the plant to be of hybrid origin, even though this might presuppose intergeneric parentage. Our plant is almost certainly identical with the Spitsbergen plant, *Puccinellia vacillans* (Fr.) Schol. (*Catebrosa concinna* ssp. *vacillans* Fr.), of which Scholander (1934, pp. 95-103, figs. 44, 47, and 48) has given a detailed account, suggesting hybridigenous origin, with *Phippsia* and *Colpodium Vahlianum* as parents.

Our plant may have resulted from such a cross, or possibly from a cross between *Phippsia algida* and *Puccinellia angustata*; all three are common in the area, and we know that Malte at any rate collected *Colpodium Vahlianum* at Craig Harbour on August 2, 1927, probably growing together with or near *Phippsia algida*. In his field notes, Malte, unfortunately, is silent on the matter.

Arctagrostis latifolia (R. Br.) Griseb.—Simmons, 1913, p. 44.

Banks Island: De Salis Bay; Sachs Harbour; Russell Point. Victoria Island: Prince Albert Sound; Holman Post; Minto Inlet, No. 17354; Anderson (Kew!); Walker Bay, No. 17482; Tahoe Lake; the south coast, Rae (Kew!); Cambridge Bay, Fortier, No. 10; Greely Haven, Fortier, No. 97. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: MacDonald, Nos. 3 and 172. King William Island: Fortier, No. 89. Prince of Wales Island: Fortier, No. 64. Also in Melville Island, and in Axel Heiberg Island, No. 18727.

A common and ubiquitous species rarely absent in any tundra association. No. 17482, collected at Walker Bay, represents an unusual xerophilous form, which, although it grew on a well-drained south-facing scree, was not yet past flowering on August 25.

Arctic Am. Range: From Alaska across to W. and E. Greenland. In Ellesmere Island north to lat. 83°.

Calamagrostis chordorrhiza Porsild in Sargentia 4:9 (1943); Nat. Mus. Canada Bull. 121 : 84 (1951) tab. 10, figs. 1 and 2.

Prince Patrick Island: Mould Bay, where it was collected on a dry, gravelly slope on July 22, 1952, by MacDonald, No. 57.

Calamagrostis chordorrhiza otherwise is known only from the type locality, on sandy cliffs on the east branch of the Mackenzie Delta, where it has been collected repeatedly.

The specimens in the present collection, except for their lower stature, are a perfect match for the type. Young plants of *C. chordorrhiza*, by their narrow, dark purple panicle and short, broad, flat leaves, are somewhat reminiscent of *Arctagrostis latifolia*.

Calamagrostis neglecta (Ehrh.) Gaertn.

Victoria Island: Read Island off the south shore. Specimens collected in a meadow above the high tidemark unfortunately were subsequently lost.

In the Arctic Archipelago otherwise known only from a couple of stations in Baffin Island and from Devon Island (75°).

Arctic Am. Range: From Alaska across to W. and E. Greenland.

Calamagrostis purpurascens R. Br.—Simmons, 1913, p. 45.

Banks Island: Nelson Head, No. 17779. Victoria Island: Holman Post, No. 17238; Minto Inlet, No. 17355; Anderson (Kew!). Axel Heiberg Island: No. 18622. In the Arctic Archipelago known otherwise from a few stations in northern Baffin Island and from Slidre Fd. in northeastern Ellesmere Island.

Arctic Am. Range: From Alaska across to W. and E. Greenland. In Greenland north to 77° 40′.

Deschampsia brevifolia R. Br.

Aira caespitosa, Simmons, 1913, p. 46, at least as regards the plant reported in the western islands.

Banks Island: Noted at Sachs Harbour; Storkerson Bay, Manning and Macpherson, No. 116; Russell Point, Nos. 17646-7. Victoria Island: Minto Inlet, Anderson (Kew! as *D. caespitosa*). Besides, known from Melville Island and from Axel Heiberg Island, Nos. 18623-26.

Occasional to common in wet clay by lake shores and river-banks and on moist, frost-activated spots in the tundra. At Russell Point, it was frequently seen growing on owl perches.

Arctic Am. Range: A high-arctic species known from high mountains of Yukon, northeastward across the Arctic Archipelago to northern E. and W. Greenland, south to northernmost islands of Hudson Bay.

Vahlodea atropurpurea (Wahlenb.) Fr.

Deschampsia atropurpurea, Simmons, 1913, p. 46.

Simmons, l.c., reports having seen in Br. Nat. Hist. Mus. a specimen of *Vahlodea* said to have been collected by Parry in North Somerset Island. Although this collection is not mentioned by Hooker (App. Parry's 3rd Voy.), Simmons thinks that the specimens may have been collected at Fury Beach.

Vahlodea atropurpurea, however, is not an arctic species and barely enters the arctic zone in Ungava. Its reported occurrence in North Somerset is decidedly open to question, and the species may safely be omitted from the flora of the Arctic Archipelago, as already done by Polunin (l.c.).

Trisetum spicatum (L.) Richt. var. **Maidenii** (Gand.) Fern.

T. spicatum, Simmons, 1913, p. 47; Macoun & Holm, 1921, p. 7.

Banks Island: Cape Lambton, No. 17540; noted at De Salis Bay, Sachs Harbour, Bernard Island, and Russell Point. Victoria Island: Holman Post, No. 17246; Wollaston Peninsula (C.A.E.); noted at Read Island, Prince Albert Sound, Minto Inlet, and Cambridge Bay. Prince Patrick Island: MacDonald, No. 71. Melville Island (acc. to Simmons). Axel Heiberg Island: Specimens from the head of Mokka Fd., No. 18642, are var. *Maidenii* (Gand.) Fern.

Arctic Am. Range: From Alaska across to E. and W. Greenland.

Pleuropogon Sabinei R. Br.—Simmons, 1913, p. 48.

(Map, figure 15, p. 51)

Banks Island: Mercy Bay, No. 17741; Russell Point, No. 17651; noted also in small lake, 50 miles south of Mercy Bay. Victoria Island: head of Minto Inlet, No. 17360; "Jackpot Lake", 60 miles east of Minto Inlet, No. 17501 (collected by Mrs. A. L. Washburn). Prince Patrick Island: MacDonald, No. 65. Melville Island: Type locality.

Occasionally in shallow water and on muddy shores of small ponds.

Arctic Am. Range: From Banks Island across the Arctic Archipelago to northernmost Ellesmere Island and northern W. and E. Greenland, south to northern Hudson Bay and northern Ungava.

Poa abbreviata R. Br.—Simmons, 1913, p. 50; Macoun & Holm, 1921, p. 7.

Banks Island: Russell Point, Nos. 17652-3; Prince of Wales Strait, on limestone cliffs 20 miles south of Russell Point, No. 17766. Victoria Island: Wollaston Peninsula (C.A.E.); Holman Post; head of Minto Inlet, No. 17361; sand-plain, 60 miles north of Cambridge Bay, No. 17472. Prince Patrick Island: MacDonald, No. 66. Melville Island (acc. to Simmons). Axel Heiberg Island: Head of Mokka Fd., Nos. 18629-30 and 18728.

Poa abbreviata is a pronounced calciphile and one of the common plants on owl perches, where it forms small, often rather compact tufts.

Arctic Am. Range: From Banks Island across to Arctic Archipelago to northern W. and E. Greenland, south to Melville Peninsula.

Poa alpigena (Fr.) Lindm. var. **colpodea** (Fr.) Schol.

(Plate XIII, figures 1 and 2)

Banks Island: Sachs Harbour, No. 17508; Russell Point, No. 17654 (f. *vivipara*). Victoria Island: Noted at Holman Post and at the head of Minto Inlet. Prince Patrick Island: Mould Bay, MacDonald, Nos. 4 and 68. In the Canadian Arctic otherwise from Cornwallis Island: Resolute Bay, Henry B. Collins, No. 210 (f. *vivipara*). Axel Heiberg Island: Head of Mokka Fd., No. 18631.

Occasional to rare in dry tundra but most often growing in moss on owl perches. Viviparous plants were noted only in such places. In all non-viviparous material examined, the anthers, although fully developed, contained no pollen. Our specimens agree well with specimens from

N.E. Greenland (Th. Sørensen, No. 2880, from Germania Land, and Nos. 4746-7 from Clavering Island), as well as with the excellent description and illustration given by Scholander (1934, pp. 89-92, figs. 42, 4).

The var. *colpodea* appears to be a high-arctic circumpolar race, which in North America thus far has been collected only in the Arctic Archipelago. *Poa alpigena*, s. str., on the other hand, although widely distributed from Alaska to E. and W. Greenland, is not truly arctic, and in North America extends north only to the Arctic Coast, northern Hudson Bay–Ungava, reaching lat. 70° N. in Baffin Island and 74° N. in Greenland. The viviparous, high-arctic *Poa* of the Eastern Canadian Arctic and Greenland, which Simmons (1906, 1913), Nannfeldt (1934, p. 34, in footnote), Polunin (1940), and others have referred to *P. pratensis* or to *P. alpigena* from its growth form and vegetative characters, seems best placed with *P. arctica* (*P. arctica* var. *vivipara* Hook.).

Poa arctica R. Br.

P. cenisia, Simmons, 1913, p. 49.

Banks Island: Nelson Head, Manning and Macpherson, No. 97; Cape Lambton; Sachs Harbour; Russell Point, No. 17655. Victoria Island: South coast, Rae (Kew!); Holman Post, No. 17241; noted at Prince Albert Sound and Cambridge Bay. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, No. 67. Also Melville Island; and King William Island, Larsen, Nos. 2 and 5.

Fairly common in not too wet tundra, by lake shores and along brooks. At Russell Point, anthesis had not yet been reached on August 15.

The rather well-marked caespitose race, ssp. *caespitans* (Simm.) Nannfeldt, so common in the northeastern Canadian Arctic and in northernmost E. and W. Greenland, thus far has not been detected in the western islands of the Archipelago. The same appears to be the case with the var. *vivipara* Hook., which in the Eastern Arctic is common from northern Hudson Bay region north to Ellesmere Island and which in E. and W. Greenland is found south to about lat. 70° N. As noted above, this has often been referred by previous writers to *Poa alpigena* f. *prolifera*.

To the interesting note by Scholander (1934, pp. 81-88) on viviparity in arctic *Poae* in Spitsbergen may be added that in arctic North America the incidence of viviparity in grasses appears to increase in high latitudes and may thus be controlled by light and temperature. It should be noted, however, that viviparity seems often more prevalent in the presence of animal manure, such as on owl perches, in the proximity of human habitation, and on bird cliffs. Although in the *Gramineae* viviparity is perhaps most common in *Poa*, it has been observed also in *Dupontia Fisheri*, *Arctophila fulva*, *Arctagrostis latifolia*, *A. arundinacea*, *Festuca brachyphylla*, and *F. rubra*. A study of viviparous arctic grasses under controlled light and temperature is most desirable and might provide much needed information on the cause of viviparity.

Arctic Am. Range: *Poa arctica* s. str. is common from Alaska across to E. and W. Greenland, north at least to lat. 80° N.

Poa glauca M. Vahl—Simmons, 1913, p. 51.

Banks Island: De Salis Bay; Cape Lambton; Sachs Harbour; Bernard Island and Russell Point, No. 17656. Victoria Island: Holman Post; Minto Inlet, No. 17362; Wollaston Peninsula, C.A.E., No. 402; and Cambridge Bay. Also from Ellef Ringnes and King William islands (acc. to Simmons), and from Axel Heiberg Island, Nos. 18632-35.

Common in dry tundra and in rocky places. At the head of Minto Inlet, *P. glauca* was one of the most common species on a gravelly flat at the mouth of a small river.

Arctic Am. Range: From Alaska across to W. and E. Greenland, northwards at least to lat. 80° N.

Poa Hartzii Gand. emend. Th. Sør.

P. abbreviata, Macoun & Holm, 1921, p. 7, not R. Br.

Victoria Island: Wollaston Peninsula, C.A.E., No. 407 (sub *P. abbreviata*). Also from Axel Heiberg Island, Nos. 18636-8, and from Stor Island in Eureka Sound, Troelsen, No. 19.

The species is a pronounced xerophyte, generally found in the driest and most exposed places, and apparently always growing in sand or gravel. Apparently an amphi-Atlantic, high-arctic species, ranging from Spitsbergen over northern E. and W. Greenland and the Arctic Archipelago, west to Victoria Island and south to lat. 69° 50′ N. in Baffin Island (head of Clyde River, Wynne-Edwards, Nos. 9019, 9055, and 9079).

Arctophila fulva (Trin.) Rupr.—Simmons, 1913, p. 51.

Banks Island: Russell Point, in shallow water in a pond, No. 17645. Victoria Island: Holman Post, sterile specimens, in 18 inches of water, forming a border around a pond, No. 17237; head of Prince Albert Sound, common by the edge of ponds, No. 17430. Prince Patrick Island: MacDonald, No. 56. Also King William Island.

In 1949 all specimens seen were sterile. Although flowers develop in favourable years, even in Prince Patrick Island (MacDonald, No. 56), the species, at least in the Arctic Archipelago, depends entirely on vegetative reproduction, for which its long and easily detached rhizomes are well suited. On the arctic mainland *A. fulva* frequently is viviparous.

Arctic Am. Range: From Alaska across to west and east shores of Hudson Bay, northwards to Banks Island and southern Baffin Island and southern W. Greenland. Lacking in E. Greenland.

Dupontia Fisheri R. Br. s. str.—Simmons, 1913, p. 51.

Banks Island: De Salis Bay; Nelson Head, Manning and Macpherson, No. 107; Cape Lambton, No. 17536 (with pubescent lemmas); Bernard Island; Mercy Bay; interior south of Mercy Bay; Russell Point, No. 17825 (var. *aristata*). Victoria Island: Read Island; Holman Post, common in swampy border of pond, No. 17239 (pubescent lemmas); Minto Inlet, Nos. 17356 and 17357 (var. *aristata*); Prince Albert Sound; south coast

(Rae, Kew!); Cambridge Bay. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: MacDonald, Nos. 58-61. Also Melville and King William islands.

The race occurring in the western islands of the Archipelago is the high-arctic polyploid *D. Fisheri* s. str. (2n=88)[1] distinguished from the more southern ssp. *psilosantha* (Rupr.) Hult. (2n=44) by its usually narrow panicle, which remains contracted during and after anthesis, with short, ascending branches bearing 2- to 4-flowered spikelets. The glumes are obtuse and rather thick and firm, the lemmas always appressed hirsute along the keel and the margins (aristate in var. *aristata* Malte in Polunin, 1940), and with anthers 2·0 to 2·5 mm. long. The characteristic difference in habit is well illustrated by Scholander, 1934, fig. 42.

The var. *aristata* appears to be as common as the typical plant; both are common everywhere in marshy places and by lake shores.

Arctic Am. Range: From arctic coast of Alaska to central west and east coast of Greenland, north to central Ellesmere Island, south to the arctic coast of the mainland and to northernmost island of Hudson Bay.

Puccinellia

Although at the time of writing Dr. Th. Sørensen's "Revision of the Greenland species of *Puccinellia* Parl. with contributions to our knowledge of the arctic *Puccinellia* flora in general" (Medd. om. Grønl. No. 136, 3, 1953) was not yet off the press, Dr. Sørensen very kindly sent me the page proof of his revision and prepared the diagnoses and the critical notes of three new species from arctic Canada (*P. agrostidea*, *P. Bruggemanni*, and *P. poacea*), unknown to him when he prepared his revision.

Dr. Sørensen, furthermore, has seen and revised all arctic material of *Puccinellia* in the National Herbarium of Canada, including all specimens from the Arctic Archipelago cited below.

Puccinellia agrostidea Th. Sør. nov. sp.

Caespitosa, tota planta purpurascens. Culmi erecti usque ad 20 cm. alti (probabile in statu maturo altiores), vulgo trifoliati. Folia caulina longe vaginata, eorum laminae stricte erectae, usque ad 5 cm. longae, ca. 1·5 mm. latae ad basin, involutae marginibus scaberrimis; vagina superior dilatata, paniculam per anthesim partim includens; ligula tenuissima, usque ad 2 mm. longa, truncata, saepe lacerata. Panicula contracta, lineari-lanceolata, 4–6 cm. longa; rami fasciculati, usque ad 6 e nodis inferioribus, appressi, capillares, fere glabri, 2–6 spiculis in pedicellis scaberulis muniti. Spiculae 4–5 mm. longae, 2–4 florae, rachilla tenuis; bracteae purpureae, nitentes, ubique translucentes, obscure nervosae, neque ciliolatae. Gluma prima 0·8–1·0 mm. longa, ovata, acuta, uninervia; secunda 1·8–2·0 mm. longa, oblongo-ovata, acutiuscula, trinervia; lemmata 2·3–3·0 mm. longa, oblonga, rotundata, vel abrupte acutata, 5-nervia, nervis ad basim ipsam aliquid pilosis; palea lemma aequans, bidentata, carinae sparse ciliato-spinulosae vel etiam glabrae. Antherae 1·2–1·5 mm. longae.

[1] Flovik (1940).

Caespitose, the whole plant purplish tinged. Culms erect, up to 20 cm. tall in the flowering state, probably taller when mature, commonly 3-leaved. Stem-leaves long-sheathing, their blades stiffly erect, up to 5 cm. long, ca. 1·3 mm. wide at the base, involute, with strongly scabrous margins; the upper sheath widened, partly embracing the panicle during anthesis; ligule very thin, up to 2 mm. long, truncate, often lacerate. Panicle contracted, linear-lanceolate, 4 to 6 cm. long; branches fasciculate, up to 6 from the lower nodes, appressed, capillary, nearly glabrous, bearing 2 to 6 spikelets on scaberulous pedicels. Spikelets 4 to 5 mm. long, 2- to 4-flowered, rachilla thin; bracts purple, shining, translucent throughout, obscurely nerved, not ciliolate. The 1st glume 0·8 to 1·0 mm. long, ovate, acute, 1-nerved; the 2nd, 1·8 to 2·0 mm. long, oblong-ovate, acutish, 3-nerved; lemmas 2·3 to 3·0 mm. long, oblong, rounded or abruptly pointed, 5-nerved, the nerves slightly hairy at the very base; palea equalling the lemma, bidentate, its keels sparsely ciliate-spinulose or even glabrous. Anthers 1·2 to 1·5 mm. long.

Banks Island: De Salis Bay on the south coast; dry tundra flat, near lagoon; on owl perch. A. E. Porsild, July 31, 1949. No. 17614 (Type). (CAN, No. 127503).

An additional specimen, at my disposal at present, viz. Anderson and Brown, No. 10338 (CAN), Alaska Highway, Mile 945, Yukon Territory, which formerly (*in* Hultén, Fl. Alas. and Yukon X, p. 1712) I referred to *P. borealis* belongs to *P. agrostidea*. Possibly some other specimens cited by Swallen and me as *P. borealis* are likewise *P. agrostidea*.

Puccinellia agrostidea may show some superficial resemblance to poorly developed *P. borealis* Swall. However, it clearly differs from that species by the narrowly contracted tiny panicle, the very thin and glossy, entire lemmas, and the longer anthers. By these characters it approaches *P. grandis* Swall., to which it seems most closely related, and differs from that species chiefly by its smaller size. It may be regarded as an arctic vicariad of the more southern *P. grandis*.

Puccinellia Andersonii Swallen—Th. Sør., 1953, p. 27.

Banks Island: Nelson Head, Manning and Macpherson, No. 99; Victoria Island, gravelly beach in vicinity of Holman Island, No. 17245. King William Island (acc. to Sørensen, l.c.). In the eastern Arctic known from North Devon Island, Malte, CAN, Nos. 118462-3 and from Fram Fd. in southern Ellesmere Island (acc. to Sørensen, l.c.)

Apparently a high-arctic littoral species thus far known from one station on the arctic coast of Alaska, from the Canadian Arctic Archipelago, and from northern E. and W. Greenland.

Puccinellia angustata (R. Br.) Rand & Redf.

Atropis angustata, Simmons, 1913, p. 53, pro max. pte.

A. distans, Simmons, 1913, p. 53, pro pte.

Banks Island: Cape Crozier on the north coast, Manning and Macpherson, No. 145; lake near northeast corner, in turfy soil on owl perch, No. 17657. Victoria Island: Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, No. 69. Isachsen Island: July 16-30, 1948,

Innis Taylor; Heywood, No. 3. Melville Island: E. Sabine (Isotype). Axel Heiberg Island: Mokka Fd., Diana Lake, No. 18639. Ellesmere Island: Eureka Sound, Aime, No. 10; Slidre Fd., Tener, No. 32; Goose Fd., Simmons, No. 3436 (sub *Glyceria distans* var. *vaginata*); Bache Peninsula, Kelsall, No. 59. North Devon Island: Beechey Island, Gunn, No. 8; McMillan, CAN, No. 77271. Cornwallis Island: Resolute Bay, Collins, No. 209; Gunn, No. 1. Baffin Island: Arctic Bay, Polunin, No. 2580; head of Clyde Inlet, Wynne-Edwards, Nos. 9054, 9076-8; Cumberland Sound, Wynne-Edwards, No. 9339.

A high-arctic, circumpolar, and non-littoral species, which in North America is known with certainty only from the Arctic Archipelago and from northern E. and W. Greenland.

Puccinellia Bruggemanni Th. Sør. nov. sp.

Perennis, caespitem usque ad 10 cm. diametrantem formans. Culmi nudi vigorosi, 7–9 cm. alti, saepe curvati, foliis multo altiores. Folia basilia vaginis latis scariosis splendentibus, longe persistentibus munitis, eorum laminae rigide recurvatae, abrupte cuspidatae, 2–4 cm. longa, usque ad 1·5 mm. latae; ligulae rotundatae. Calami folium singulum basi insertum, eius vagina ampla subinflata, lamina 1–2 cm. longa, ligula 1–1·8 mm. longa, subacuta, scariosa, decurrens. Panicula obscure purpurea, 1·5–2·0 cm. longa, contracta; ramis in paribus e nodis inferioribus, appressis, spiculis singulis, rarius binis. Pedicelli glabri aut spinulis perpaucis asperi. Spiculae ovatae, 4·5–6·0 mm. longae, 3–4 florae; rachilla gracilis; glumae saepe herbaceae et ad basin virescentes, prima 1·5–1·7 mm. longa, ovata, acuta, uninervia, secunda 2·2–2·5 mm. longa, obovata, triangulariter acuta, saepe irregulariter sinuato-dentata, trinervia; lemmata 3·0–3·4 mm. longa, incurvata, obtusiuscula, quinque-nervata, dorso pilosissima in nervi inferioris tertia (vel dimidia) parte et basin versus inter nervos; margines albescentes erosi, sed non ciliolati. Palea vigorosa, colorata, bifida, lemma aequans vel paululum brevior, carinae tota longitudine pilosissima. Antherae 0·6–0·8 mm. longae. Granum (immaturum) 2·0 mm. longum.

Perennial, caespitose, forming tufts up to 10 cm. in diameter. Culms naked, stout, 7 to 9 cm. tall, often curved, much exceeding the leaves. Basal leaves with broad, scarious shiny and long-persistent sheaths; blades rigid, recurved, involute, abruptly pointed, 2 to 4 cm. long, up to 1·5 mm. wide when flattened out, ligules rounded. The single stem-leaf inserted at the base of the culm, its broad sheath subinflated, blade 1 to 2 cm. long, ligule 1 to 1·8 mm. long, subacute, scarious decurrent. Panicle dark-purple, 1·5 to 2·0 cm. long, contracted; branches in pairs from the lower nodes, appressed, each with one (rarely two) spikelet. Pedicels glabrous or with a few coarse spinules. Spikelets ovate, 4·5 to 6·0 mm. long, 3- to 4-flowered; rachilla slender; glumes often herbaceous and greenish at base; the 1st, 1·5 to 1·7 mm. long, ovate, acute, one-nerved; the 2nd, 2·2 to 2·5 mm. long, obovate, the tip acute, often irregularly sinuate-dentate, 3-nerved; lemmas 3·0 to 3·4 mm. long, incurved, obtusish, 5-nerved, strongly hairy dorsally on the nerves in the lower third (half) and between the nerves at the base; the margin whitish, erose, though not ciliolate. Palea firm, coloured, bifid, as long as the lemma or somewhat shorter than it, its keels strongly hairy throughout. Anthers 0·6 to 0·8 mm. long. Grain (immature) 2·0 mm. long.

Prince Patrick Island: Mould Bay, 76° 14′ N., 118° 57′ W., around lemming burrows on mound of damp sand, P. F. Bruggemann, August 8, 1952, No. 470, (Type–DAO, Isotype–C). North Devon Island: Beechey Island, 74° 45′ N., 92° 30′ W., Malte, No. 118471 (CAN). Bathurst Island: 75° 53′ N., 102° 24′ W., Jenness, No. 9 (CAN). North Kent Island: 76° 26′ N. 89° 45′ W., Simmons, No. 4014(C).

Puccinellia Bruggemanni superficially resembles *Poa abbreviata* and, unlike most other members of the genus, is probably not halophilous—a peculiarity it shares with *P. angustata*. For that reason, and because of its hairy lemmas and paleas, it may easily be mistaken for a stunted *P. angustata* but may always be distinguished by the somewhat incurved lemmas. The resemblance, however, is only superficial, and *P. Bruggemanni* is probably not even closely related to *P. angustata*, from which it differs by its lack of stomata on the underside of the leaves—a rare feature in *Puccinellia*—and one only very rarely known to occur in *P. phryganodes*, to which species *P. Bruggemanni* is not even closely related. There seems, on the other hand, to be some slight indication of a relationship to the Siberian *P. tenuiflora* (Turcz.) Krecz.

Puccinellia phryganodes (Trin.) Scribn. & Merr.

Atropis maritima, Simmons, 1913, p. 53.

Banks Island: Noted as common everywhere along the seashore. Victoria Island: Noted as common along the west coast of the island; flowering and sterile specimens at Holman Post, Nos. 17242-3. Prince Patrick Island: Mould Bay, MacDonald, No. 70. King William Island (acc. to Simmons.). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

A turf-forming circumpolar littoral species, which is common or even ubiquitous on sheltered beaches near or slightly below the reach of high tides. Although perhaps most often completely sterile, flowering specimens can nearly always be found late in the season in somewhat drier habitats.

N. Am. Arctic Range: Seashores from Alaska to Labrador and E. and W. Greenland, north across the Arctic Archipelago to beyond lat. 80° N. in Greenland.

Puccinellia poacea Th. Sør. nov. sp.

Caespitosa; culmi sat robusti, siccitate striati, erecti e basi geniculata, 20–25 cm. alti, dimidio inferiore tantum foliiferi; folia caulina vulgo 2, eorum laminae 3–4 cm. longae, 1·5–2 mm. latae, involutae, superne profunde sulcatae, margine scabro, ligula vigorosa, 1·5–2·5 mm. longa, subtruncata, decurrens; innovationum laminae usque ad 6 cm. longae, setaceae, curvatae, subsquarrosae. Panicula obscure purpurea, aperta, oblongo-pyramidalis, ca. 6 cm. longa, ad basin ca. 4 cm. lata; rami fasciculati longitudine inaequali, usque ad 7 e primo nodo, divaricati, graciles, scaberuli, purpurei, spiculis 1–4 pedicellatis. Spiculae oblongae, 6–7 mm. longae, 4–5 florae; rachilla gracilis; bracteae distincte nervigerae, neque ciliolatae; glumae subcarinatae, prima ovata, acuta, 1·2–1·7 mm. longa, uninervia; secunda oblonga, subacuta, 1·9–2·2 mm. longa, trinervia; lemmata 2·6–3·1 mm. longa,

oblonga, rotundata, marginibus late luteo-hyalinis, quinquenervia, nervis ad quartam inferiorem partem longe-pilosis; palea lemma aequans, bidentata, carinae superne scabrae, basin versus glabrae. Antherae 1·5–2·5 mm. longae.

Caespitose; culms rather stout, striate when dried, erect from a geniculate base, 20 to 25 cm. tall, leafy only in the lower half; stem-leaves commonly 2, their blades 3 to 4 cm. long, 1·5 to 2 mm. wide, involute, deeply furrowed above, the margins scabrous; ligule prominent, 1·5 to 2·5 mm. long, subtruncate, decurrent; blades of the innovations up to 6 cm. long, setaceous, curved, subsquarrose. Panicle dark-purple, open, oblong-pyramidal, ca. 6 cm. long, ca. 4 cm. wide at the base; branches fascicled, of unequal length, up to 7 from the first node, spreading, slender, scaberulous, purple, bearing 1 to 4 pedicelled spikelets. Spikelets oblong, 6 to 7 mm. long, 4- to 5-flowered; rachilla slender; bracts distinctly nerved, not ciliolate; glumes subcarinate, the 1st ovate, acute, 1·2 to 1·7 mm. long, 1-nerved; the 2nd, oblong, subacute, 1·9 to 2·2 mm. long, 3-nerved; lemmas 2·6 to 3·1 mm. long, oblong, rounded, broadly yellowish hyaline-margined, 5-nerved, the nerves long-pilose in their lower fourth; palea equalling the lemma, bidentate, its keels scabrous above, glabrous toward the base. Anthers 1·5 to 2·0 mm. long.

Ellesmere Island: Slidre Fd., Black Top River Valley, 3 miles inland, 50 ft. alt., J. S. Tener, July 20, 1951, No. 35 (Type) (CAN, No. 208828); same place, August 9, 1951, Tener, No. 33; Slidre Fd., 2 miles west of weather station, Tener, No. 34. Axel Heiberg Island: Diana Lake at head of Mokka Fd., approx. 79° 30′ N., 88° 30′ W., Porsild, Nos. 18640-1; northeast corner of Stor Island, Eureka Sound, 200 ft. above sea-level, August 18, 1952, J. C. Troelsen, No. 19A. Thus far known only from the stations cited.

Puccinellia poacea seems to be related to *P. arctica* (Hook.) Fern. & Weatherby, from which it differs by its stout habit, shorter leaves, and its long-exserted spreading panicle. Besides, some floral characters should be emphasized: The glumes are more or less carinate; the lemmas are remarkably straight and, apart from the hyaline margin, of a rather firm texture, not, as in *P. arctica*, incurved from the base, and glossy and translucent throughout.

Puccinellia vaginata (Lge.) Fern. & Weath.

Victoria Island: head of Prince Albert Sound, on low, alluvial riverbanks, No. 17434. In the Arctic Archipelago, otherwise known only from Bylot Island, Button Point, Malte, CAN, No. 125617, and from Baffin Island: Cumberland Sound, Taylor, CAN, No. 29118.

N. Am. Range: According to Dr. Sørensen's revision of specimens in the National Herbarium of Canada, *P. vaginata* has been collected along the arctic coast of Yukon: Shingle Point, Porsild, No. 7084; Mackenzie Delta region: Porsild, Nos. 2134, 2547, and 2962; Cape Dalhousie, Porsild, No. 2709; Bernard Harbour, C.A.E., No. 488; and from Hudson Bay: Churchill, Porsild, No. 5390. The var. *elegans* Sør. is known from northern Labrador-Ungava, and var. *paradoxa* Sør. from the west coast of Hudson Bay, southern Baffin Island, and the Labrador coast.

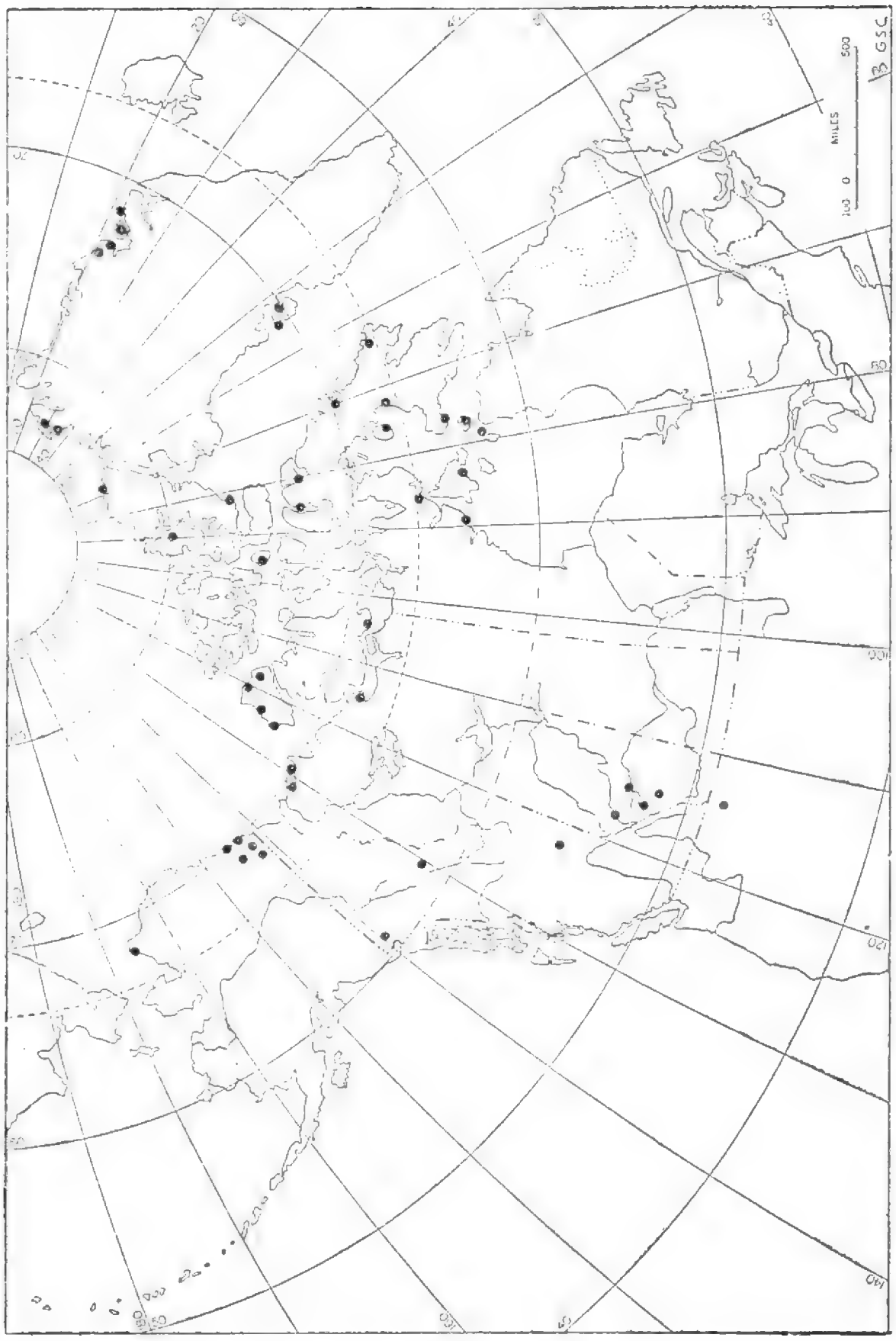

Figure 17. North American range of *Festuca baffinensis*.

Colpodium Vahlianum (Liebm.) Nevski

Atropis Vahliana, Simmons, 1913, p. 53.

Puccinellia Vahliana (Liebm.) Scribn. & Merr.

Banks Island: Sachs Harbour, No. 17509; Cape Lambton, No. 17539; Bernard Island, No. 17742. Victoria Island: Vicinity of Holman Post, in moist, heavily manured places, No. 17244. King William Island (acc. to Simmons, l.c.).

A non-littoral, high-arctic species often growing in moist clay and gravelly places. Although not anthropochorous, it is strongly nitrophilous and responds by lush growth.

Arctic Am. Range: From Banks Island across the Arctic Archipelago to northern E. and W. Greenland reaching north beyond lat. 80° N., south to the Arctic Coast, northern Hudson Bay region and the northern tip of Ungava-Labrador. One isolated alpine station in the Mackenzie Mts. in approx. lat. 64° N.

Festuca brachyphylla Schultes s. str.

F. brevifolia R. Br. Chloris Melvilliana, 1823, p. 31.

F. ovina, Simmons, 1913, p. 54.

Banks Island: De Salis Bay, No. 17613; north coast, M'Clure (Kew!); Russell Point, No. 17648. Victoria Island: Read Island; Holman Post; Minto Inlet, Anderson (Kew!); Prince Albert Sound; south coast, Rae (Kew!). Also Melville, Axel Heiberg, and King William islands.

Noted as common in barren, windswept places but occasionally also in turfy places and rarely absent on owl perches.

Arctic Am. Range: From Alaska across to W. and E. Greenland; north beyond lat. 80° N.

Festuca baffinensis Polunin, Nat. Mus. Canada Bull. 92 : 91 (1940), Plate III.

(Map, fig. 17)

The circumpolar, widely distributed *F. brachyphylla* Schultes (*F. brevifolia* R. Br.) is distinguished by perfectly glabrous, wiry and smooth culms, by setaceous, strongly involute leaves, and by a narrow panicle. A viviparous form, not to be confused with *F. vivipara* (L.) Sm., occurs sporadically from Alaska to N.E. Greenland but is rather uncommon in the Arctic.

Festuca baffinensis is more arctic and high alpine, and apparently is entirely confined to calcareous soils of the Palaeozoic series. From the somewhat polymorphous *F. brachyphylla*, it is at once distinguished by its broader and shorter, almost ovoid, and usually somewhat secund panicle, which as a rule, is dark purple, and by its broader and less strongly involute leaves. Its most striking and constant character, however, is in the culm, which in its upper half is densely tomentose, with short and distinctly curved hairs, visible only under a lens. The anthers average slightly shorter than in *F. brachyphylla* (0·4 to 0·6 mm.).

The type of *F. baffinensis* came from Pond Inlet, Baffin Island, and in the diagnosis Polunin emphasized the broad panicle, thick and pubescent rachis, and small anthers said to be only 0·03 to 0·5 mm. long[1]. The very striking pubescence of the culm is mentioned only incidentally in the discussion, where *F. baffinensis* is compared with "hairy forms" of *F. brachyphylla*, which, according to Polunin, occur in other parts of Arctic America and in Spitsbergen but are said to lack the extremely short anthers of *F. baffinensis*.

Sørensen (1933), under *Festuca ovina* vars. *brevifolia* and *supina*, has discussed the variations, distribution, and ecology of *F. baffinensis* and *F. brachyphylla* in N.E. Greenland and in tabs. 18 and 19 shows typical high-arctic specimens.

Polunin recognized *F. baffinensis* from only five stations, all in Ellesmere and Baffin islands. The type (Polunin, No. 706), from Pond Inlet, illustrated on page 92, l.c., is not, as claimed, in the National Herbarium of Canada. In two other specimens of the type series (Polunin, Nos. 318 and 2478) from Cape Dorset and Craig Harbour, the length of the anthers range from 0·4 to 0·6. In the National Herbarium of Canada there are now some 70 specimens from Greenland, arctic North America, and from the Rocky Mountains. Although some of these specimens by Polunin were referred to *F. brachyphylla*, they are, in every respect, including the slightly shorter anthers, a close match for *F. baffinensis*. Greenland: East Coast, between lat. 72° 54′–74° 52′ N., Th. Sørensen, Nos. 2867, 3218, 4709, 4714, 4718, and 4721; North Coast, Gunnar Anderson Valley (82° 28′ N.), July 11, 1917, and John Murray Island (82° 45′ N.), July 3, 1917, Th. Wulff; West Coast, Nugssuak Peninsula (70° 44′ N.), July 31, 1921, A. E. Porsild; *ibid.* (70° 16′ N.), August 31, 1928, M. P. Porsild; *ibid.* (70° 18′ N.), July 4, 1929, M. P. and R. T. Porsild. Arctic Canada: Ellesmere Island: Bache Peninsula, Malte, CAN, No. 118363; Craig Harbour, Polunin, No. 2478. Axel Heiberg Island: Head of Mokka Fd., Porsild, Nos. 18627–8. North Devon Island: Beechey Island, McMillan, CAN, No. 77270. Baffin Island: Pond Inlet, Soper, CAN, No. 111361; Admiralty Inlet, *idem*, CAN, No. 111380; Cape Searle, Wynne-Edwards, Nos. 9105 and 9134; Cape Dorset, Polunin, No. 318; Taverner Bay, E. W. Manning, Nos. 2 and 130. Hudson Bay Region: Repulse Bay, Dutilly, No. 2117; Roes Welcome, south of Wager Inlet, 5th Thule Exp., No. 687; Southampton Island, Malte, CAN, Nos. 120639 and 120650; Prince Charles Island, Baldwin, No. 1893; Digges Island, R. Bell, CAN, No. 38298; Salisbury Island, Burwash, CAN, No. 212766. Western Archipelago: Cornwallis Island, Aime, No. 2; Victoria Island, September 2, 1949, A. H. Gibson; Banks Island, Castel Bay, Jenness, No. 56; Cape Lambton, Porsild, No. 17537; Mercy Bay, Manning and Sparrow, No. 191; Storkerson Bay, Manning and Macpherson, No. 117; Cape Crozier, *iidem*, No. 144. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Arctic Mainland: Mackenzie District: Rae River, Dr. Richardson; Cape Dalhousie, Porsild, Nos. 2693-5; Atkinson Point, *idem*, Nos. 2554-5. Arctic Alaska: Icy Reef, Can. Arct. Exp. No. 157; Camden Bay, *idem*, No. 10; Sadlerochit R., Spetzman, No. 831; Lake Schrader, *idem*, No. 756; Sunset Pass, *idem*, No. 1151; Lake Peters, *idem*, No. 1414; Point Hope, Scamman, No. 6364.

[1] Clearly a misprint for 0·3 to 0·5.

Yukon Territory: Rocky Summit, Mile 132, Canol Road, Porsild, No. 9900; Lake Kluane to Donjek River, Nos. 11-27, 1920, A. Müller.

British Columbia: Mount Selwyn, H. M. Raup, No. 3923.

Alberta: Jasper Park, Mount Edith Cavell, elev. 7,500 ft., J. M. Macoun, CAN, No. 98859; Shovel Pass, elev. 7,000 ft., *idem*, CAN. No. 98222. Banff Park, Sulphur Mt., elev. 7,400 ft., Malte and Watson, No. 2290; Wart Mt., elev. 7,400 ft., *idem*, No. 2275; Mount Inglismaldi, F. J. Lewis, No. 216; near Banff, elev. 8,000 ft., Macoun, CAN, No. 38391; Bow Pass, *idem*, CAN, No. 38393; Mount Eisenhower, elev. 8,000 ft., Porsild and Breitung, No. 15821; Mount Bourgeau, elev. 9,700 ft., *iidem*, No. 13786; Citadel Peak, elev. 8,400 ft., *iidem*, No. 14050; Sunshine Ski Lodge, elev. 7,500 to 8,000 ft., *iidem*, Nos. 13415, 13455, and 15913.

Montana: Cedar Mt., elev. 11,000 ft., Rydberg and Bessey, No. 3679. General range of *F. baffinensis*: From arctic Alaska across the Arctic Archipelago to northern E. and W. Greenland, south to northern Hudson Bay region, and on high peaks of the Rocky Mts. south to Montana. Everywhere restricted to calcareous soils chiefly of the Palaeozoic series.

Festuca rubra L. var. **arenaria** (Osbeck) Fr.

Banks Island: Nelson Head, where it was rare on a sandy outwash plain, No. 17780. Victoria Island: Prince Albert Sound, No. 17431; and Holman Post.

A low-arctic species, which in our area is rare and perhaps restricted to favourably exposed and protected places.

New to the Arctic Archipelago.

Arctic Am. Range: From Alaska along arctic coast of Mackenzie District, Banks and Victoria islands, across to Hudson Bay and Labrador, W. and E. Greenland.

Agropyron latiglume (Scribn. & Sm.) Rydb.

Agropyrum violaceum Simmons, 1913, p. 55, not Hornem.

Agropyron alaskanum Macoun & Holm, 1921, p. 8, not Scribn. & Merr.

Banks Island: De Salis Bay; Nelson Head, Manning and Macpherson, No. 108; Cape Lambton, No. 17534; Sachs Harbour, No. 17507; Prince of Wales Strait, 20 miles south of Russell Point, No. 17765. Victoria Island: Wollaston Peninsula, C.A.E., Nos. 405 and 406 (CAN); Holman Post, No. 17236; head of Minto Inlet, No. 17353; *ibid.*, Anderson (Kew!); Walker Bay, Nos. 17481 and 17794. Also in Axel Heiberg Island, Nos. 18619-20.

Agropyron latiglume is fairly common on dry, well-drained soil of the trap-sedimentary series. It varies considerably in regard to degree of pubescence of the lemma and the length of its awn. In Nos. 17481 and 17794, growing side by side at Walker Bay, the lemmas of the first are quite

pubescent, whereas those of the latter are totally glabrous. Most of the plants seen on Banks Island were long-awned; in some, the length of the awn equals that of the lemma (No. 17534).

Following the recent treatment by Melderis in Sv. Bot. Tidsskr. 1950, our plant should be referred to *Roegneria borealis* (Turcz.) Nevski var. *hyperarctica* (Polunin) Meld. or to its forma *glabra* Meld. If maintained under *Agropyron*, it becomes *A. latiglume* var. *pilosiglume* Hult., Fl. Alas. and Yukon 2 : 259 (1942).

Arctic Am. Range: From Alaska to Hudson Bay and Ungava, Labrador, W. and E. Greenland; north through the Archipelago to northern Ellesmere Island (81° 43′).

Elymus arenarius L. ssp. **mollis** (Trin.) Hult.

E. mollis, Simmons, 1913, p. 56.

Banks Island: De Salis Bay; Cape Lambton. Victoria Island: Read Island; Holman Post; head of Minto Inlet, No. 17358; *ibid.*, Anderson (Kew!); Prince Albert Sound; Cambridge Bay. Also King William Island.

Fairly common and probably rarely missing on somewhat sheltered gravelly or sandy beaches. On a strandflat at the head of Minto Inlet the culms were only 5 inches high, and the flowers in beginning anthesis on August 3.

Arctic Am. Range: From Alaska to Labrador and southern W. and E. Greenland, north to Banks Island and northern Baffin Island. Isolated inland stations at Great Bear Lake, Great Slave Lake, Lake Athabasca, and the Great Lakes.

CYPERACEAE

Eriophorum callitrix Cham.

Banks Island: Cape Lambton, No. 17545. Victoria Island: Holman Post, Nos. 17257-8; Tahoe Lake, No. 17451; Washburn Lake, No. 17456.

Occasional to common locally, on wet clay spots in tundra, but by no means found everywhere in such habitats.

Arctic Am. Range: Sporadic from Bering Strait to Ungava and Labrador, north to Banks and northern Baffin islands, south to Newfoundland; E. Greenland (but, strangely enough, lacking in W. Greenland).

Eriophorum russeolum Fr. var. **leucothrix** (Blomgr.) Hult.—Cody, 1953.

Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Eriophorum Scheuchzeri Hoppe.—Simmons, 1913, p. 57.

Banks Island: De Salis Bay; Nelson Head, Manning and Macpherson, No. 110; Cape Lambton; Ballast Beach, Miertsch. (Kew!); Baring Land, Anderson (Kew!); Castel Bay, Jenness, No. 50; Cape Crozier, Manning and

Macpherson, No. 146; Mercy Bay, Manning and Sparrow, No. 192; Russell Point, No. 17662. Victoria Island: Wollaston Peninsula; Minto Inlet; *ibid.*, Anderson (Kew!); Prince Albert Sound; Tahoe Lake, Cambridge Bay, Anderson; Richard Collinson Inlet, Jenness, No. 11. Prince Patrick Island: MacDonald, No. 77. Isachsen Island: Heywood, No. 4. Melville and King William islands (acc. to Simmons).

Common in wet clay by the edge of ponds and by lake shores.

Arctic Am. Range: Common from Bering Strait to E. Greenland, in Ellesmere Island north beyond lat. 83° N.

Eriophorum triste (Th. Fr.) Hadač & Löve in Bot. Not. 1950, p. 34.

E. angustifolium var. β, R. Brown, 1824.

E. polystachyon, Simmons, 1913, p. 57, in part.

(Plate XIV, figures 1 and 2; map, fig. 18)

Banks Island: De Salis Bay, Manning and Macpherson, No. 57; Cape Lambton, No. 17543; Sachs Harbour; Baring Land, M'Clure (Kew!); Mercy Bay, Miertsch. (Kew!); Russell Point, No. 17661. Victoria Island: Wollaston Peninsula, C.A.E.; noted in Prince Albert Sound; Holman Post; Minto Inlet and Cambridge Bay. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: MacDonald, Nos. 75 and 76. Melville and King William islands (acc. to Simmons).

Robert Brown, l.c., was probably the first to call attention to a scabrous peduncled arctic *E. angustifolium* var. β, "pedunculis scabris, denticulis crebis minutis", collected in Melville Island by members of Parry's 1st Expedition. Simmons (1906) noted that at least some Ellesmere specimens had scabrous peduncles, dark, even quite black, scales, and thus represented the var. *triste* described from Spitsbergen by Th. Fries (1869). Sørensen (1933) noted that in N.E. Greenland var. *triste* is a well-marked race, geographically as well as ecologically distinct from *E. angustifolium* Honck.

Eriophorum triste clearly belongs in the group of amphi-Atlantic, high-arctic species that over northern Greenland extend across the Canadian Arctic Archipelago south to the tree-line and reach their westernmost outposts in mountains of Yukon and central and northern Alaska. It is a pronounced calcicole and in the writer's experience commonly grows in wet calcareous tundra or near the lower edge of snowbanks. In such places it is often associated with *Carex membranacea*, *Kobresia simpliciuscula*, *Eriophorum Scheuchzeri*, *E. callitrix*, *Juncus castaneus*, *J. albescens*, *J. biglumis*, *Saxifraga Hirculus*, and others. While the habitat of *E. triste* may be wet in spring and early summer, it usually dries up in mid- or late-summer. In the writer's experience *E. triste* never grows in wet bogs or by the edge of acid ponds, nor associated with *E. angustifolium*. *E. triste* is decidedly high-arctic, and although the southern part of its range overlaps that of *E. angustifolium*, the latter is absent in the western and northern parts of the Arctic Archipelago but in the Precambrian parts of the eastern Arctic extends north at least to lat. 70°.

General Distribution: Amphi-Atlantic, high-arctic. From mountains of central Alaska and Yukon east and north across the Arctic Archipelago north beyond lat. 83°; northern E. and W. Greenland, Spitsbergen.

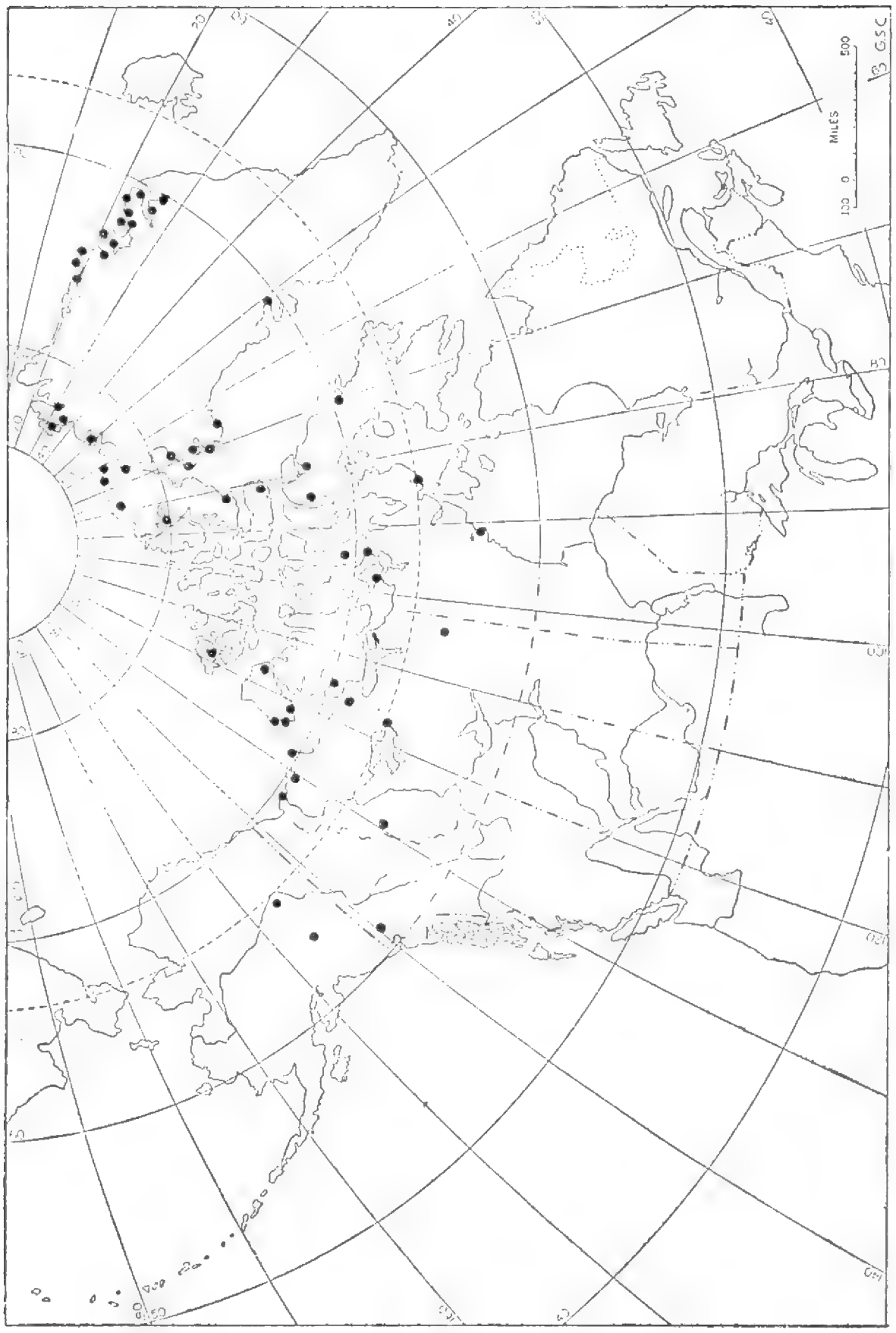

Figure 18. North American range of *Eriophorum triste*.

Eriophorum vaginatum L.—Simmons, 1913, p. 56.

Banks Island: Cape Lambton, No. 17544. Victoria Island: Holman Post, No. 17259; Minto Inlet, No. 17371; *ibid.*, Anderson (Kew!); noted north of Prince Albert Sound and on Tahoe Lake.

On Banks Island, *E. vaginatum* is common locally in wet tundra only in the vicinity of Cape Lambton but was not seen north of there.

The eastern race, *E. vaginatum* ssp. *spissum* (Fern.) Hult., is distinguished from *E. vaginatum* s. str. by its depressed, globose spike, less inflated upper sheaths, and shorter anthers. It ranges from northern Baffin Island south to Newfoundland, Nova Scotia, New England, and Pennsylvania, and west to Indiana, Wisconsin, and the Great Lakes. In Keewatin and eastern Mackenzie districts and in northern Saskatchewan and Alberta where their ranges overlap, the two races are often difficult to separate. In the specimens cited above, the anthers are longer than in ssp. *spissum*, averaging slightly over 2·0 mm. in the dry state, and accordingly belong to the western race.

Arctic Am. Range: From Bering Strait east to central Keewatin, north to the Arctic Coast and to southern Banks and Victoria islands.

Kobresia hyperborea Porsild in Nat. Mus. Canada Bull. 121 : 103 (1951), Plate XII, 3-5.

K. arctica Porsild, in Sarg. 4 : 15 (1943) not *K. arctica* Ivanova.

(Map, fig. 12, p. 44)

Victoria Island: Holman Post, No. 17260; Walker Bay, No. 17487. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

In both places the species was rare and local, growing on south-facing, turfy slopes. The present collections constitute a considerable extension of the known range of this very distinct and clear-cut species, the type of which came from the Mackenzie Delta.

Distribution: *Kobresia hyperborea* is an endemic of northwestern Mackenzie, ranging from the Mackenzie Delta east to the Thelon River, south to Great Bear Lake, and westward into Alaska in the Brooks Range. Its closest affinity appears to be with the Cordilleran *K. macrocarpa* and with the east Asiatic *K. schoenoides*.

Kobresia myosuroides (Vill.) Fiori & Paol.

K. Bellardii, Simmons, 1913, p. 58.

Banks Island: De Salis Bay; Cape Lambton, No. 17546; Sachs Harbour, No. 17511. Victoria Island: Read Island, No. 17191; Wollaston Peninsula; Holman Post; Minto Inlet; *ibid.*, Anderson (Kew!); noted at Walker Bay; Prince Albert Sound and Cambridge Bay. Axel Heiberg Island: head of Mokka Fd., No. 18646.

Common in dry, sandy, gravelly and rocky places, particularly in the southern parts of the islands.

Arctic Am. Range: From Bering Strait to E. Greenland, north in Ellesmere Island beyond lat. 81° N., south to central Keewatin and northern Ungava-Labrador.

Kobresia simpliciuscula (Wahlenb.) Mack.

Victoria Island: Holman Post; Minto Inlet, in wet clay by lake shore, No. 17372; Walker Bay, on a dry, grassy slope, No. 17488; west end of Tahoe Lake, in wet tundra, No. 17452.

A pronounced calcicole noted as occasional to rare, growing in clay soil often by the edge of snow-beds.

Arctic Am. Range: Here and there, but seldom common, from Bering Strait to central W. and N.E. Greenland, north to lat. 80° N. on the west coast of Ellesmere Island.

Carex nardina Fr. var. **atriceps** Kük. *See* Porsild in Sarg. 4 : 15-17 (1943).

Victoria Island: Holman Post; Walker Bay, No. 17485, where it was common locally on rocky and grassy slopes and screes of the trap-sedimentary series. Axel Heiberg Island: Common on diorite at Diana Lake, head of Mokka Fd., No. 18645.

Carex nardina var. *atriceps* is an eastern race which on the mainland becomes progressively less common west of Keewatin with isolated stations on Great Bear Lake, southeast Yukon, and the Brooks Range of northern Alaska. In Greenland and Ellesmere Island it ranges north beyond lat. 80° N.

Carex maritima Gunn.

C. incurva, Simmons, 1913, p. 60.

Banks Island: Bernard Island, No. 17743; Russell Point, 460 feet above sea-level, 20 miles inland, growing in turfy places on owl perches with *Ranunculus Sabinei,* No. 17659. Victoria Island: Read Island, No. 17188; Holman Post, No. 17250; Minto Inlet; *ibid.,* Anderson (Kew!); head of Prince Albert Sound, No. 17435. King William Island: Larsen, No. 7. Axel Heiberg Island: Head of Mokka Fd., No. 18643.

Noted as common on sheltered sandy and gravelly beaches.

Arctic Am. Range: A mostly littoral species on sheltered sandy sea shores from Bering Strait to W. and E. Greenland. In Ellesmere Island, north to lat. 81° 43′ N.

Carex chordorrhiza Ehrh.

Victoria Island: In wet tundra near west end of Tahoe Lake, No. 17449. Our specimens were in beginning anthesis on August 4.

On the mainland, *C. chordorrhiza* does not range far beyond the limit of trees; it was a distinct surprise, therefore, to find it common locally in Victoria Island. In the Arctic Archipelago, *C. chordorrhiza* was previously known from a single station in southern Baffin Island.

Arctic Am. Range: From northern Alaska, over Mackenzie Delta and southern Victoria Island, to Ungava and southern Baffin Island. Thus far not recorded from Greenland.

Carex ursina Dew.

Banks Island: Noted at De Salis Bay; Russell Point. Victoria Island: Read Island, No. 17190; Holman Post; head of Minto Inlet, No. 17370. Prince Patrick Island: MacDonald, No. 74.

A littoral species commonly growing together with *Puccinellia phryganodes* on sheltered beaches.

Arctic Am. Range: From Alaska along the Arctic Coast to central W. and E. Greenland, north across the Arctic Archipelago to lat. 78° 48′, south in Hudson Bay to Cape Jones.

Carex amblyorhyncha Kretz.

Victoria Island: Noted at Holman Post; head of Minto Inlet, No. 17366; Cambridge Bay, in wet tundra near Hudson Bay Post, No. 17466.

Böcher (1952) has shown that the *C. Heleonastes–amblyorhyncha* complex is of almost circumpolar range and is composed of two easily distinguished species: *C. Heleonastes* with its ssp. *neurochlaenea* (*C. neurochlaenea* Holm) is of subarctic-continental range, whereas the range of *C. amblyorhyncha* and its ssp. *pseudolagopina* (*C. pseudolagopina* Sør.) is arctic-continental.

The North American range of *C. amblyorhyncha* shown by Böcher's map (l.c., fig. 12) suggests an eastern population centering around the northern Hudson Bay – Hudson Strait region, separated by a broad gap from a western population, extending from northern Alaska east along the Arctic Coast to Great Bear Lake.

Additional collections in the National Herbarium of Canada, all originally labelled *C. Lachenalii*, bridge this gap and extend the known range of *C. amblyorhyncha* beyond the Arctic Coast to lat. 73° in the Arctic Archipelago.

N. Alaska: Sadlerochit River, Spetzman, No. 1067; Lake Schrader, *idem*, No. 298. Mackenzie District: Bathurst Inlet, Kelsall and McEwen, No. 223. Keewatin District: Yathkyed Lake, Porsild, No. 5763. Southampton Island: Coral Harbour, Malte, CAN, No. 120699. Baffin Island: Lake Harbour, Malte, CAN, No. 118502; Putnam Island, 63° 57′ N.–77° 50′ W., Baldwin, No. 1853; Arctic Bay, 73° 5′, Polunin, No. 2570. East coast of James Bay: Long Island Sound and Cape Jones, Baldwin, Hustich, etc., Nos. 298 and 299.

Arctic Am. Range: In rather damp tundra, from the north coast of Alaska east along the Arctic Coast to the northern Hudson Bay region, north to Victoria and northern Baffin islands, south to Great Bear Lake, Central Keewatin, and James Bay. In E. and W. Greenland represented by the ssp. *pseudolagopina* (Sør.) Böcher.

Carex glareosa Wahlenb. var. **amphigena** Fern.

Victoria Island: Holman Post, in turfy places near the beach, No. 17249.

A littoral species which is new to the flora of the western Archipelago.

Arctic Am. Range: From Bering Strait along the arctic sea coast to central and southern W. and E. Greenland. In Ellesmere Island north almost to lat. 80° N.

Carex scirpoidea Michx.—Simmons, 1913, p. 60.

Banks Island: Noted at Cape Lambton. Victoria Island: Read Island; Wollaston Peninsula; Holman Post, No. 17255; Minto Inlet; *ibid.*, Anderson (Kew!); Prince Albert Sound; Tahoe Lake; Cambridge Bay, No. 17466.

Fairly common in the southern parts of the islands in turfy, calcareous soil on sunny, south-facing slopes and ledges.

Arctic Am. Range: From Bering Strait to central and southern W. and E. Greenland. In the eastern Arctic north to lat. 74° 35′ N.

Carex rupestris All.—Simmons, 1913, p. 60.

Banks Island: De Salis Bay; Cape Lambton; Sachs Harbour; Russell Point. Victoria Island: Read Island, No. 17189; Wollaston Peninsula; Holman Post, No. 17254; Minto Inlet; interior north of Prince Albert Sound. King William Island (acc. to Simmons).

A pronounced calciphile, common in dry tundra, on gravelly ridges and on rocky ledges.

Arctic Am. Range: A single station in western Alaska (Seward Peninsula), then common from the east end of Brooks Range across arctic Canada to northern and central W. and E. Greenland. In Ellesmere Island north to lat. 81° 43′ N.

Carex glacialis Mack.

Victoria Island: Noted at Holman Post; wind-blown gravel ridges north of head of Prince Albert Sound, No. 17365. New to the western Archipelago.

Arctic Am. Range: Rare and uncommon from Bering Strait to W. and E. Greenland. In Ellesmere Island north to lat. 79°.

Carex vaginata Tausch.—Simmons, 1913, p. 62.

Victoria Island: Holman Post, No. 17828; Minto Inlet; *ibid.*, Anderson (Kew!); interior north of Prince Albert Sound.

Rare and perhaps limited to southern exposures in the southern parts of the islands. In the Arctic Archipelago otherwise known from a single station in southern Baffin Island.

Arctic Am. Range: From arctic and subarctic Alaska to Hudson Bay and Labrador-Ungava. A single station in E. Greenland (74° 10′ N.)

Carex capillaris L. s. str.

Victoria Island: Read Island, No. 17187; noted at Holman Post, Walker Bay, and Tahoe Lake.

New to the western Archipelago where apparently it is rare and local in wet clay spots in tundra. All specimens seen belong to the typical low arctic form, with approximate, short-peduncled pistillate spikelets and a very small, terminal staminate spikelet.

Arctic Am. Range: From Alaska across to W. and E. Greenland, north to lat. 77° 40′.

Carex petricosa Dew.

(Map, fig. 10, p. 44)

Victoria Island: Walker Bay, on a dry, south-facing, rocky slope, No. 17486.

An unexpected extension of the known range of this Cordilleran species, which was long known only from the type locality: "The summit of Rocky Mountains—Drummond" and from a few stations in Banff National Park. It has recently been reported from Pelly Mountains in S.E. Yukon, the Mackenzie Mountains, Great Bear Lake, and from Liverpool Bay on the Arctic Coast east of the Mackenzie Delta (Porsild, 1943, 1945, and 1951). At Walker Bay *C. petricosa* flowered on August 23. The terminal 1 to 3 spikelets are staminate or at most with 1 or 2 pistillate flowers at the base; the uppermost pistillate spikelets have a few staminate flowers at their summit.

General Distribution: Canadian Rocky Mountains from lat. 50° N., north to the Arctic Coast, Great Bear Lake, and Victoria Island, west to mountains of central and northern Alaska.

Carex misandra R. Br.—Simmons, 1913, p. 63.

Banks Island: De Salis Bay; Cape Lambton; Sachs Harbour; No. 17510; Russell Point. Victoria Island: Read Island; Wollaston Peninsula; Holman Post, Nos. 17251 and 17252; Minto Inlet, Anderson (Kew!); interior north of Prince Albert Sound; Cambridge Bay, Anderson (Kew!). Melville and King William islands (acc. to Simmons). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Head of Mokka Fd., No. 18644.

A truly arctic species common in dry tundra and on rather dry, south-facing slopes.

Arctic Am. Range: From Bering Strait across the arctic parts of the Continent to northern W. and E. Greenland.

Carex atrofusca Schk.

C. ustulata, Simmons, 1913, p. 63.

Banks Island: Cape Lambton, No. 17541. Victoria Island: Holman Post, No. 17247; head of Minto Inlet, No. 17364; Cambridge Bay, Anderson (Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

A truly arctic species, common in rather wet tundra.

Arctic Am. Range: From Bering Strait across the arctic zone to northern W. and E. Greenland; in Ellesmere Island north beyond lat. 83° N.

Carex rariflora (Wahlenb.) Sm.

Victoria Island: Holman Post, by the edge of a tundra pond, No. 17253.

A subarctic species in the Arctic Archipelago, otherwise known from southernmost Baffin Island.

Arctic Am. Range: From Bering Strait across to central and southern W. and E. Greenland where it ranges north to lat. 74° 10′.

Carex lugens Holm.

C. rigida, Simmons, 1913, p. 61.

(Map, fig. 14, p. 51)

Victoria Island: Holman Post, No. 17248; head of Prince Albert Sound, No. 17436.

Occasional in well-developed grassy tundra. The plant reported by Hooker as *C. rigida,* said to have been collected in Banks Island by Anderson, may belong here, or it may be *C. stans* or possibly *C. membranacea.* No specimens of *C. lugens* or of the *C. Bigelowii* (*C. rigida* or *C. concolor*) complex were seen by me on Banks Island, nor was I able to locate the Anderson specimen in Kew Herbarium.

Range of *C. lugens*: From E. Asia through Central Alaska and Yukon to Mackenzie Delta east to Victoria Island.

Carex Bigelowii Torr.—Cody, 1953.

Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

An amphi-Atlantic species that from Labrador-Ungava extends north to lat. 80° N. in Ellesmere Island, and west across the Precambrian Shield to Great Slave Lake.

Carex stans Drej.

C. aquatilis var. *stans,* Simmons, 1913, p. 61.

Banks Island: Noted at De Salis Bay, Manning and Macpherson, No. 58; *idem,* Nelson Head, No. 109; Cape Lambton and at Mercy Bay; Ballast Beach, Miertsch. (Kew!); Russell Point, Nos. 17658 and 17660. Victoria Island: Holman Post, No. 17256; head of Minto Inlet, No. 17820; *ibid.,* Anderson (Kew!) noted at Prince Albert Sound; Tahoe Lake, No. 17450; Cambridge Bay, No. 17463; *ibid.,* Fortier, No. 17. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 72 and 73. According to Simmons also in Melville, Axel Heiberg, and King William islands.

Common in wet tundra and on marshy lake shores.

Arctic Am. Range: From Bering Strait across to northern Hudson Bay and Ungava to northern W. and E. Greenland; north across the Archipelago to beyond lat. 83° N. in Ellesmere Island.

Carex subspathacea Wormskj.

C. salina var. *subspathacea,* Simmons, 1913, p. 62.

Banks Island: Noted as common at De Salis Bay and at Cape Lambton. Victoria Island: Read Island; head of Minto Inlet, No. 17369. Also from King William Island according to Simmons.

An arctic, littoral species common on sandy and clayey shores of brackish lagoons and sheltered bays, where it forms a firm turf and is frequently associated with *Carex ursina* and *Puccinellia phryganodes.*

Arctic Am. Range: From Bering Strait along the Arctic Coast to the Hudson Bay region and Ungava. Labrador north across the southern islands of the Archipelago to North Devon. Central W. Greenland, but in N.E. Greenland to lat. 77° 40′ N.

Carex physocarpa Presl.

Victoria Island: Head of Minto Inlet, in a wet meadow by a stream, No. 17368; head of Prince Albert Sound, in wet meadows by the river, No. 17437.

Apparently rare, and in our area limited to most favourable habitats. The species is new to the flora of the Archipelago.

Arctic Am. Range: From Bering Strait east to Bathurst Inlet.

Carex membranacea Hook.

C. membranopacta, Simmons, 1913, p. 64.

C. compacta, Macoun and Holm, 1921, p. 9.

C. rigida, Macoun and Holm, 1921, p. 9.

Banks Island: De Salis Bay: Cape Lambton, No. 17542; Sachs Harbour, Storkerson Bay, Manning and Macpherson, No. 118. Victoria Island: Read Island; Wollaston Peninsula, C.A.E.; Holman Post; head of Minto Inlet, No. 17367; *ibid.*, Anderson (Kew!); head of Prince Albert Sound; Cambridge Bay, No. 17465. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince of Wales Island: Fortier, No. 80; and King William Island (acc. to Simmons).

Common, at least in the southern parts of the islands where it perhaps is the most common sedge.

General Range: From E. Asia across the arctic and subarctic zone to Ellesmere, Baffin Island, and Labrador, southward to the limit of trees. Strangely enough this high-arctic species has not crossed from Ellesmere Island to N.W. Greenland.

JUNCACEAE

Juncus albescens (Lge.) Fern.

Banks Island: Noted at Cape Lambton and at Russell Point. Victoria Island: Holman Post, No. 17261; head of Minto Inlet, No. 17373; inland north of Prince Albert Sound.

Perhaps common throughout in calcareous sand and gravel in wet tundra and by brooks.

Arctic Am. Range: From mountains of central and northern Alaska across arctic and subarctic Canada to Labrador-Ungava. North across the Archipelago to lat. 80° N. in Ellesmere Island. W. Greenland.

Juncus balticus Willd. var. **alaskanus** (Hult.)—Porsild in Nat. Mus. Canada, Bull. 121 : 125 (1951).

Victoria Island: Head of Minto Inlet, in wet clay by a brook, No. 17375.

New to the Arctic Archipelago.

Arctic Am. Range: From Bering Strait east to Bathurst Inlet and north to Victoria Island, south to the tree-line east of Great Bear and Great Slave lakes.

Juncus biglumis L.—Simmons, 1913, p. 65.

Banks Island: Cape Lambton; Russell Point, No. 17663. Victoria Island: Holman Post, 25-cm.-tall specimens from heavily manured, moist slope, No. 17262; head of Minto Inlet, Nos. 17374 and 17376; Washburn Lake. Prince Patrick Island: Mould Bay, MacDonald, Nos. 78-80. Melville and King William islands (acc. to Simmons). Axel Heiberg Island: head of Mokka Fd., No. 18647.

Apparently common in wet tundra.

Arctic Am. Range: From Bering Strait to W. and E. Greenland north across the Archipelago to the northern tips of Ellesmere Island and Greenland.

Juncus castaneus Sm.

Victoria Island: Holman Post, heavily manured, moist grassy slope, No. 17263; head of Minto Inlet, in wet clay by a brook, No. 17377.

Apparently rare and restricted to calcareous clay and sand by lake shores and along brooks in the most favoured habitats in the southern parts of the island.

Arctic Am. Range: Wide-ranging subarctic species; from Bering Strait to W. and E. Greenland, in E. Greenland north to 77° 37′.

Luzula confusa Lindebl.

L. arcuata, Simmons, 1913, p. 66.

Banks Island: North coast near Cape Crozier, Manning and Macpherson, No. 147; by a lake 50 miles south of Mercy Bay, where it was common on a rocky plateau, No. 17736; Russell Point. Victoria Island: Holman Post, No. 17264; head of Minto Inlet, No. 17378. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 82 and 83. Melville Island (acc. to Simmons). Axel Heiberg Island: Hyperite Point (acc. to Simmons); common at the head of Mokka Fd., No. 18648.

Rare or occasional on rocky slopes in Banks and Victoria islands.

Arctic Am. Range: Wide-ranging arctic; from Bering Strait to W. and E. Greenland, north to lat. 83° 39′.

Luzula nivalis (Laest.) Beurl.—Simmons, 1913, p. 67.

Banks Island: Noted at Cape Lambton; on a lake 50 miles south of Mercy Bay; Cape Crozier, Manning and Macpherson, No. 148; Mercy Bay, Manning and Sparrow, No. 193; Russell Point, No. 17664. Victoria Island: Holman Post, No. 17265; head of Minto Inlet. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 81, 84-86. King William Island (acc. to Simmons). Axel Heiberg Island: head of Mokka Fd., Nos. 18649-50.

Rare or occasional in wet tundra, in Banks and Victoria islands.

Arctic Am. Range: In North America *L. nivalis* s. str. is an eastern arctic race which from E. and W. Greenland extends westward to the Mackenzie and Yukon but becomes rare and sporadic in Alaska; it is widely distributed throughout the Arctic Archipelago and in Ellesmere and Greenland reaches beyond lat. 83° N. The well-marked var. *latifolia* (Kjellm.) Sam. extends from Bering Strait eastward along the Arctic Coast only to the Mackenzie but thus far has not been collected on the arctic islands.

LILIACEAE

Tofieldia coccinea Richards.

Banks Island: Cape Lambton, in wet gravelly places in tundra, No. 17553. Victoria Island: Holman Post, in dry tundra, Nos. 17266-8; Walker Bay, No. 17489. In the Archipelago otherwise known from northern and central Baffin and N. Devon islands.

General Range: An arctic-subarctic species known from northern Ural eastward through Siberia, Alaska to central W. and E. Greenland, where it ranges north to lat. 77° 32′; south to northern Ungava, Keewatin, and Mackenzie districts with isolated stations in northern British Columbia and Alberta, south to Jasper Park.

Although often growing in turfy places, *T. coccinea* generally favours calcareous gravels, and its peculiar, spotty distribution is undoubtedly due to special edaphic requirements.

Tofieldia pusilla (Michx.) Pers.
T. palustris Huds.

(Map, fig. 8, p. 39)

Victoria Island: Holman Post, rare in dry tundra, No. 17269; Walker Bay, No. 17490. In the Arctic Archipelago otherwise known from southern and central Baffin Island.

Arctic Am. Range: From Bering Strait to central and southern W. and E. Greenland north to 74° 55′.

SALICACEAE

Salix alaxensis (Anders.) Coville

S. alascensis, Simmons, 1913, p. 68.

Banks Island: M'Clure (Kew!). Victoria Island: Holman Post; head of Minto Inlet, low, erect shrub by a lake shore, No. 17379; seedling on an alpine slope, No. 17819.

Fairly common in protected places where on south-facing slopes it forms small thickets. Thus at Orpiksoit, near Holman Post, a 5-foot-high thicket covered an area approximately one acre in extent, in a sheltered valley along a stream.

Arctic Am. Range: From Bering Strait across to the west coast of Hudson Bay. In the western Archipelago north to Banks Island but apparently absent in the eastern Archipelago.

Salix arctica Pall.—Simmons, 1913, p. 70.

S. anglorum, Macoun and Holm, 1921, p. 10.

S. glauca, Simmons, 1913, p. 69, pro min. pte.

Banks Island: De Salis Bay, No. 17615; same place, Manning and Macpherson, No. 70; Cape Lambton, in grassy places below a bird cliff, Nos. 17547 and 17548B; Sachs Harbour, No. 17512; Russell Point, creeping shrub with half-inch-thick stem, No. 17795; low and prostrate shrub, No. 17665; Mercy Bay, Miertsching (Kew!); Baring Land, M'Clure (Kew!). Victoria Island: Read Island, No. 17192; Wollaston Pen., C.A.E.; Holman Post, low, ascending shrub, No. 17272; head of Minto Inlet, creeping shrub on a strandflat, No. 17380; *ibid.*, Anderson (Kew!); west end of Tahoe Lake, No. 17453; Cambridge Bay, creeping shrub in rocky places, No. 17467; *ibid.*, Anderson (Kew!); Richard Collinson Inlet, Jenness, No. 18; Greely Haven, Fortier, No. 98. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 8, 87, 88, and 89. Melville Island: MacMillan, CAN, No. 77317. King William Island: Larsen, Nos. 8 and 10. Axel Heiberg Island: Head of Mokka Fd., Nos. 18651-2.

S. arctica is the most common willow in Banks and Victoria islands, where, as elsewhere, it varies considerably according to soil, snow cover, and exposure. Dr. C. R. Ball, who kindly examined my specimens from Banks and Victoria islands, distinguished *S. arctica* Pall. and *S. anglorum* Cham. and its varieties *kophophylla* and *antiplasta.* The specimens, which by Dr. Ball are considered *S. arctica,* differ chiefly by having larger leaves and catkins, but I rather suspect that ecological and edaphic reasons may account for this and prefer, at least for the present, to maintain the series cited above under the admittedly polymorphous *S. arctica* Pall.

Arctic Am. Range: From Bering Strait across to Labrador, Ungava north to Baffin, the northern tip of Ellesmere Islands and to N.W. and N.E. Greenland.

Salix arctophila Cockr.—Cody, 1953.

Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

A subarctic, wide-ranging American species, which from W. Greenland extends west to the Mackenzie, south to the tree-line, and in the Eastern Arctic north to southern Ellesmere Island.

Salix niphoclada Rydb.

S. glauca, Simmons, 1913, p. 69, in part.

Banks Island: De Salis Bay, on hummocks in dry tundra, No. 17616; same place, Manning and Macpherson, No. 44. Victoria Island: Holman Post, prostrate but not creeping shrubs, forming compact cushions in exposed, rocky places, No. 17270; head of Minto Inlet, stony summit of rocky ledge, No. 17381.

The plants that Simmons, l.c., reported as collected by M'Clure on Banks Island, by Anderson on Victoria Island at Minto Inlet, and by Rae on the south coast, undoubtedly belong here. McMillan's willow from Melville Island (CAN, No. 77317), which Simmons on Macoun's authority cited as *S. glauca,* on the other hand is *S. arctica.*

S. niphoclada grows in rocky, windswept places, where it forms low, compact cushions or tussocks, which by their grey-green colour are easily spotted from a distance. The linear-lanceolate leaves are villous beneath and glabrate above.

Distribution: Alaska, Yukon, and western Mackenzie east to Great Bear Lake, north to Banks and Victoria islands.

Salix pseudopolaris Flod. *See* Porsild in Bull. Nat. Mus. Canada 121 : 139 (1951).

S. myrtilloides, Simmons, 1913, p. 69.

S. ? *myrsinites,* Simmons, 1913, p. 72.

S. glacialis, Simmons, 1913, p. 73.

Banks Island: Cape Lambton, Nos. 17548-9; Sachs Harbour, No. 17513; Bernard Island, No. 17744; Ballast Beach, Miertsch. (Kew!); north coast, Storkerson Bay, Manning and Macpherson, No. 119; Mercy Bay, Manning and Sparrow, No. 194; Russell Point, No. 17666. Victoria Island: Holman Post, Nos. 17271 and 17273; head of Minto Inlet on alpine summit, No. 17382; "Jackpot Lake", 60 miles east of head of Minto Inlet, No. 17502 (collected by Mrs. A. L. Washburn); along lake shore 60 miles north of Cambridge Bay, No. 17473.

This tiny willow is almost as common in Banks and Victoria islands as is *S. arctica* but is found only on snow-beds, especially in damp swales where the snow remains until late in the season. In such places *S. pseudopolaris* only reached the flowering stage late in August, in 1949.

Simmons, l.c., reported having seen a specimen of *S. glacialis* at Kew, collected in Banks Island by Miertsching. I was unable to discover the specimen at Kew, but in view of the abundance of *S. pseudopolaris* in Banks and Victoria islands, I am inclined to believe that the Miertsching plant, when re-examined, will prove to be *S. pseudopolaris.* Simmons

also, on Hooker's authority, reported *S. myrtilloides* and *S. myrsinites*, the first from Banks Island, the latter from Victoria and King William islands. He had, however, not seen the specimens upon which the report was based and obviously doubted their correctness. Both will undoubtedly prove to be *S. pseudopolaris*.

Arctic Am. Range: Arctic and alpine parts of Alaska and Yukon and not previously recorded east of the Mackenzie. In the Cordillera south to northern British Columbia.

Salix reticulata L.—Simmons, 1913, p. 74; Macoun and Holm, 1921, p.10.

Banks Island: De Salis Bay, No. 17617; same place, Manning and Macpherson, No. 46; Cape Lambton, No. 17550. Victoria Island: Noted at Holman Post; Minto Inlet; *ibid.*, Anderson (Kew!); Prince Albert Sound; Cambridge Bay; *ibid.*, Anderson (Kew!); *ibid.*, Fortier, No. 24. King William Island: Larsen, No. 9. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Occasional to common on south-facing slopes and in protected places in the southern parts of the islands.

Arctic Am. Range: From Bering Strait east to Labrador and Baffin Island, north to Devon Island. Lacking in Greenland.

Salix Richardsonii Hook.—Simmons, 1913, p. 68; Macoun and Holm, 1921, p. 10.

Banks Island: De Salis Bay, low, erect bushes on hummocks in wet tundra, No. 17618; *ibid.*, Manning and Macpherson, No. 69; Cape Lambton, forming a 2-foot-high thicket below a bird cliff, No. 17551; Sachs Harbour, Manning and Sparrow, No. 231. Victoria Island: Wollaston Peninsula, C.A.E.; noted at Holman Post; Minto Inlet, *ibid.*, Anderson (Kew!) north of Prince Albert Sound, south coast, Rae (Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

As *S. reticulata*, restricted to protected habitats in the southern parts of the islands.

Arctic Am. Range: From Bering Strait east to Baffin Island, north to lat. 72° 43′ N. Lacking in Greenland.

BETULACEAE

Betula glandulosa Michx.—Macoun and Holm, 1921, p. 10.

Victoria Island: Wollaston Peninsula, C.A.E. (acc. to Macoun and Holm, but no supporting specimen in the National Herbarium of Canada); Holman Post, No. 17274.

Very rare and restricted to sheltered places on the southwestern parts. My specimens collected at Holman Post had only come into flower on August 8 and did not appear to have matured fruits in the preceding year.

Arctic Am. Range: From Bering Strait east to southern Baffin Island[1] and southernmost W. and E. Greenland.

POLYGONACEAE

Oxyria digyna (L.) Hill.—Simmons, 1913, p. 75; Macoun and Holm, 1921, p. 11.

(Map, fig. 7, p. 39)

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 50 and 75; Cape Lambton; Sachs Harbour, Storkerson Bay, Manning and Macpherson, No. 120; Cape Crozier, *idem*, No. 149; Castel Bay, Jenness, No. 61, Mercy Bay, Miertsch. (Kew!); Baring Land, M'Clure (Kew!); Russell Point. Victoria Island: Wollaston Peninsula, C.A.E.; Holman Post, No. 17275; Prince Albert Sound; Minto Inlet, Anderson (Kew!); Walker Bay; Cambridge Bay, Anderson (Kew!) Richard Collinson Inlet, Jenness, No. 14. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 9, 10, 90, and 91. Prince of Wales Island: Fortier, Nos. 37 and 75. Melville and Bathurst islands (acc. to Simmons). King William Island: 5th Thule Exp., No. 1230; Larsen, No. 12. Axel Heiberg Island: No. 18653.

Common in moist ravines, by brooks, and on screes where the snow remains late. At Holman Post some specimens measured 33 cm. in height. The succulent leaves and young flowering stems are edible, raw or cooked. Both are eaten by caribou, musk-oxen, and snow geese, but lemmings and arctic hares prefer its fleshy rhizomes.

Arctic Am. Range: Common and widespread from Bering Strait to W. and E. Greenland, north to lat. 83° 39′.

Polygonum viviparum L.—Simmons, 1913, p. 75; Macoun and Holm, 1921, p. 11.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 13, 17, and 84; Cape Lambton, No. 15552; Sachs Harbour; Storkerson Bay, Manning and Macpherson, No. 121; Bernard Island; Baring Land, M'Clure (Kew!); Mercy Bay, Manning and Sparrow, No. 195. Victoria Island: Read Island; Wollaston Peninsula, C.A.E.; Holman Post, Nos. 17276-7 (f. *paniculata* Porsild); Prince Albert Sound; Minto Inlet, *ibid.*, Anderson (Kew!); Walker Bay; Cambridge Bay; *ibid.*, Anderson (Kew!); *ibid.*, Fortier, No. 14. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, No. 11. Melville Island (acc. to Simmons). King William Island: Larsen, No. 11; Fortier, No. 90. Axel Heiberg Island: No. 18654.

Common everywhere except in the wettest habitats.

Arctic Am. Range: Common and widespread, from Bering Strait to W. and E. Greenland, north to lat. 83° 39′.

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[1] In Castanea, 1951, H. M. Raup published a list of plants collected in the Canadian Arctic in 1938 by H. F. Conn. Among them are a number of non-arctic species, including *Calamagrostis canadensis* var. *Langsdorffii*, *Betula glandulosa*, *Potentilla Crantzii*, *Rhinanthus groenlandicus*, *Solidago multiradiata* and *Erigeron unalaschkensis*, that although said to have been collected at Fort Ross, north Somerset Island, otherwise are known only from stations several hundreds of miles to the south. The fact that H. F. Conn collected what looks like identical material at Hebron in Labrador, where these species are common, suggests that, somehow, the labels in Mr. Conn's collection got mixed. The collection is in the Herbarium of West Virginia University and was sent to me for examination by the kindness of Dr. Earl L. Core.

PORTULACACEAE

Montia lamprosperma Cham.

Victoria Island: Holman Post, common locally on moist, heavily manured slope, just above the beach, No. 17286.

With an unreported collection from Shingle Point, on the arctic coast of Yukon, Porsild, No. 7096, the present collection closes a large gap between western Alaska and Hudson Bay.

Arctic Am. Range: The North American range of *Montia lamprosperma* strongly suggests that the species is maritime, being common on the shores of the Bering Sea region and in the eastern subarctic (Ungava-Labrador, southern Baffin Island, and southern E. and W. Greenland). From the broad gap separating the eastern and the western populations, we know only three widely separated stations (Chesterfield Inlet, Victoria Island, and the arctic coast of Yukon). Since these stations are all near Eskimo habitations, the possibility cannot be overlooked that the species was accidently distributed by the Eskimo.

CARYOPHYLLACEAE

Stellaria ciliatosepala Trautv.

In his revision of "*Stellaria longipes* and its allies", Hultén (1943, p. 257) has taken up *S. ciliatosepala* stating that "it is closely related to *S. longipes* on the one hand and to *S. crassipes* on the other", and that "The best characteristics distinguishing it from both the above species is the ciliated scarious or scarious-margined bracts and the distinctly ciliated sepals. The middle joints of the stem are almost always markedly villose or pilose". In his map (Fig. 4) Hultén gives the distribution known to him for *S. ciliatosepala* and its var. *arctica* (Schischkin) Hult., showing a circumpolar type of range, however, with large gaps between Alaska-Yukon and Greenland, on one hand, and in Siberia between the mouth of Lena River and Chukotsk Peninsula, on the other.

In the National Herbarium of Canada some 40-odd collections of *Stellaria*, ranging from east Greenland to Alaska, have scarious, more or less ciliated bracts, scarious-margined, ciliated, but otherwise glabrous sepals, and should accordingly be referred to *S. ciliatosepala, s. lat.* The material is not uniform, however: one group of specimens have perfectly glabrous stems, but in another the internodes are distinctly pilose. Thus specimens from interior Alaska and Yukon are a good match for f. *pilosa* Trautv. (Florula Taymyrensis phaenogama, in Middendorff Sib. Reise Vol. 1, tab. 8b). The plant of more arctic range, however, represented in the National Herbarium of Canada by some 30-odd specimens, ranging from east Greenland to arctic Alaska, have totally glabrous internodes matching f. *glabra* Trautv. (l.c., tab. 8a) and thus may be identical with *S. arctica* Schischkin, which Hultén, l.c., reduced to a variety of *S. ciliatosepala*, even though *S. arctica* was described as being densely caespitose, sub-pulvinate, with solitary or rarely 2-flowered glabrous stems 3 to 5 cm. high.

Hultén, l.c., p. 261, who had seen no material of *S. subvestita* Greene (Ottawa Nat. 15 : 42, 1901) concluded from the description that it is synonymous with *S. ciliatosepala* Trautv. This interpretation can scarcely be correct, for although *S. subvestita*, like *S. ciliatosepala* in Alaska-Yukon, has pilose internodes and was described as having scarious-margined sepals "and the nerve often pilose", the large material of *S. subvestita* in the National Herbarium of Canada shows the sepals to be perfectly glabrous and non-ciliate. In a duplicate of the type, however, a few hairs can be detected at the base of the nerve on the sepals of one or two flowers. *S. subvestita*, furthermore, is a plains species which from the southern Hudson Bay region extends west across the plains to the foothills of the Rocky Mountains and north to S.E. Yukon. In central Yukon and Alaska, intermediate forms connecting *S. ciliatosepala*, *S. subvestita*, and *S. Laxmanni* (sensu Hultén) are not uncommon.

The following specimens of *S. ciliatosepala* are in the National Herbarium of Canada:

A. *Race with glabrous internodes:*

Greenland, West Coast: Godhavn, July 20, 1924, A. E. Porsild; Inglefield Gulf, Olrik Bay, 77° 21′ N., 68° 12′ W., Bartlett, Nos. 83 and 142. Greenland, East Coast: Payer Land, Grant Fiord, off Clavering Fiord, Bartlett, No. 412. Canadian Arctic Archipelago, Victoria Island: Holman Island, on heavily-manured grassy slope, Porsild, No. 17285. Specimens are 15 cm. tall and except for the conspicuously ciliate sepals are totally glabrous and fresh green. Prince Patrick Island: Mould Bay, MacDonald, Nos. 101-103. Melville Island: Winter Harbour, McMillan, CAN, No. 77307. Ellesmere Island: Slidre Fiord, Tener, No. 60; Craig Harbour, 1935, Kearney. North Devon: Beechey Island, McMillan, CAN, No. 77272. North Baffin Island: Eclipse Sound, Freuchen, No. 869; Pond Inlet, Malte, CAN, No. 118800; Arctic Bay, Malte, CAN, Nos. 118787 and 118799. South Baffin Island: Amadjuak Bay, Soper, CAN, No. 125983; Frobisher Bay, Thacker, No. 29. Keewatin District: Maguse River, Gussow, No. 25. Northern Manitoba: Nueltin Lake, Baldwin, No. 2306; Churchill, J. M. Macoun, CAN, No. 79095. Mackenzie District: Lower Thelon River, Tener, No. 203; Artillery Lake, Seton and Preble, CAN, No. 78317; northwest and north shore of Great Slave Lake, Howe, CAN, No. 91981; west shore of Great Bear Lake, Bell, CAN, No. 22883; Ft. Franklin, Porsild, No. 3201; Mackenzie Delta, Kittigazuit Island, Porsild, Nos. 2345 and 2476; Richards Island, Porsild, No. 7067; Lindsey, No. 664; east slope of Richardson Mountains, Porsild, No. 7332.

B. *Race with pubescent internodes:*

Yukon Territory: McQuesten area, Pelly Farm, Campbell, No. 76; lower Klondike, Cockfield, No. 15; Nation River, 65° 31′ N., 141° W., Cairnes, CAN, No. 83051; Dawson, Macoun, CAN, No. 58414; Mayo District, Minto Bridge, Cockfield, CAN, No. 24694; Edwards Creek, Bostock, No. 51; Ft. Selkirk, Gorman, No. 382 (in part); Kluane Lake, Clarke, No. 161. Alaska: Gakona, Richardson Highway, Anderson, No. 8529; Franklin, Forty Mile District, Anderson and Gasser, No. 7298;

Alaska Range, Healy, Porsild, No. 344; Alaska Highway, Northway Airbase, Anderson, No. 9084A; Lower Yukon, Kokrines Mountains, Porsild, No. 729.

Stellaria crassifolia Ehrh.

Victoria Island: Holman Post, on a moist, heavily manured grassy slope growing together with *Montia lamprosperma*, No. 17283.

Arctic Am. Range: From Bering Strait to Hudson Bay and Ungava north to Victoria Island, islands in Foxe Basin, and southern Baffin Island. As yet unrecorded from Greenland.

Stellaria humifusa Rottb.

Banks Island: Noted at Cape Lambton, Sachs Harbour, and Russell Point. Victoria Island: Noted at Read Island, Holman Post, Prince Albert Sound, and Cambridge Bay. Also from King William Island.

Common everywhere in Banks and Victoria islands in sheltered places along the seashore.

Arctic Am. Range: A littoral species common along the sea-coast from Bering Strait across to W. and E. Greenland, north at least to lat. 79° N.

Stellaria longipes Goldie var.—Simmons, 1913, p. 76.

S. Edwardsii Hook. Fl. Bor.-Am. 1 : 96 (1830) tab. XXXI.

S. monantha Hult. in Bot. Not. 1943, p. 265, fig. 7, e. f., map fig. 9.

S. laeta Hult., *ibid.*, p. 264, fig. 7, g. h., map fig. 8.

Banks Island: De Salis Bay, No. 17622; same place, Manning and Macpherson, Nos. 15 and 21; Nelson Head, No. 17824; same place, Manning and Macpherson, No. 94; Cape Lambton, No. 17560; Sachs Harbour; Mercy Bay, Storkerson Bay, Manning and Macpherson, No. 124, Manning and Sparrow, Nos. 199, 200; Russell Point, No. 17678. Victoria Island: Read Island, No. 17194; Wollaston Peninsula; Holman Post, No. 17284; Minto Inlet; *ibid.*, Anderson (Kew!); Prince Albert Sound; Cambridge Bay; *ibid.*, Anderson (Kew!). Prince of Wales Island: Fortier, No. 71. Melville Island: Jenness, No. 24. King William Island: Larsen, Nos. 17 and 18. Isachsen Island: Heywood, No. 7. Axel Heiberg Island: Head of Mokka Fiord, Nos. 18664-67.

In the collections in the National Herbarium of Canada, most of the specimens in the large series of *Stellaria longipes* s. lat. from the North American Arctic have single flowers arising from the axils of normal or somewhat reduced, non-scarious-margined leaves.

About half the specimens have glabrous sepals and, following Hultén's recent treatment (l.c., 1943), should be referred to *S. monantha* Hult. (which, judging from his description, seems indistinguishable from *S. Edwardsii* Hook. as described and illustrated by Hook., l.c.). In the other half, the sepals are ciliated and more or less pubescent on the back, and thus, following Hultén's recent treatment, should be called *S. laeta*. It should be noted, however, that specimens in which pubescent or glabrous sepals occur in the same plant are by no means rare. Although the series

shows considerable variation in growth form, it seems very doubtful, however, if the habit of the plant has much, if any, taxonomical significance, for it will at once be apparent, when observed in the field, that specimens growing in exposed places tend to be densely tufted, and those growing in shaded rock crevices or among boulders have elongated internodes. Plants growing in sand or gravel, however, develop elongated, much branched rhizomes.

In the Canadian Arctic *S. longipes, s. lat.* normally reproduces by vegetative means, although apparently capable of producing viable seeds in favourable seasons. Under truly arctic conditions, fruiting, however, is rarely observed (Greenland; Murchison Sound, 77° 40′ N., Aug. 27, 1921, Nygaard. Canada; Hudson Bay Region: Prince Charles Island, Aug. 20, 1949, Baldwin, No. 1956; Cape Wolstenholme, Aug. 26, 1928, Malte, CAN, No. 120940; Rankin Inlet, Aug. 30, 1910, J. M. Macoun, CAN, No. 79098; Mackenzie Delta, July 17, 1927, Porsild, No. 2083).

Böcher and Larsen (1950) report that *S. longipes*, grown from seed obtained from Churchill, furnished chromosome counts of $2N = 52$, while in *S. monantha* from W. Greenland the values obtained were $2N = 104$, or the same as reported by Flovik (1940) for *S. crassipes* from Spitsbergen.

In the *Stellaria longipes* complex, Hultén (l.c.) for North America recognizes "6 distinct species, each with its own geographical area" (*S. longipes* Goldie s. str., *S. crassipes* Hult., *S. monantha* Hult., *S. laeta* Richards., *S. Laxmanni* Fisch., and *S. ciliatosepala* (Trautv.). To these should be added at least three other and equally distinct "species", of which no material was available to Hultén when he made his revision. These are *S. subvestita* Greene, *S. stricta* Richards., and *S. arenicola* Raup. All three are great plains species occurring in Canada between Hudson Bay and the Rocky Mountain foothills and when keyed out with Hultén's key (l.c. p. 253) fall into *S. longipes* s. str.

It seems doubtful if the taxonomy of this complex but very interesting group can be satisfactorily cleared up except by close study, under controlled conditions, of material grown from seed or from transplants.

Cerastium alpinum L.—Simmons, 1913, p. 77, in part.

Although common and widespread in the Eastern Canadian Arctic, the writer has seen no typical *C. alpinum* from the western islands of the Archipelago; nor is typical *C. alpinum* found in Alaska (cf. Hultén, Fl. Alas. and Yukon, p. 666, 1944) where on the Arctic Coast it seems represented by *C. Bialynickii* Tolm., which throughout arctic Siberia is the closest representative of *C. alpinum*.

Cerastium arcticum Lge.

C. alpinum ("form No. 2") Simmons (1906), p. 121.

C. alpinum, Simmons, 1913, p. 77, in part.

Banks Island: De Salis Bay, No. 17620; Bernard Island, No. 17746; Cape Crozier, Manning and Macpherson, No. 150; Mercy Bay, Manning and Sparrow, No. 196; Russell Point, northeast corner, No. 17669. Melville Island: Winter Harbour, McMillan, CAN, Nos. 77275 and 77291; head of

Liddon Gulf, Jenness, No. 33. Prince Patrick Island: Mould Bay, MacDonald, Nos. 12, 94, and 95. Isachsen Island: Innis Taylor, CAN, No. 152011; Heywood, No. 5. Prince of Wales Island: Guillemard and Allen lakes, Fortier, Nos. 38 and 76. Cornwallis Island: H. B. Collins, CAN, No. 206634. Axel Heiberg Island: Head of Mokka Fd., No. 18657. King William Island: Larsen, No. 19.

Besides these, the following specimens from the Eastern Canadian Arctic are in the National Herbarium of Canada: N. Somerset Island: Point Leopold, Malte, CAN, No. 118738. N. Devon Island: Malte, CAN, No. 118745. N.E. Ellesmere Island: Parr Inlet, MacDonald, Nos. 19-21; Cape Sheridan, Kelsall, No. 43.

Although Simmons, (l.c.) did not attempt to subdivide his material of *C. alpinum*, he clearly recognized and also discussed the ecology of what is obviously typical *C. arcticum* in his material (form No. 2) and also (form Nos. 3 and 4) *C. Regelii*. He noted that form No. 2 "showed a certain resemblance to *C. Edmon[d]stonii*" and in his later paper (1913) actually listed *C. Regelii* as a separate species.

Grave doubt has been expressed by Scholander (1934) and others regarding the practicability, in the admitted absence of good morphological characters, of dividing the notoriously polymorphic *C. alpinum* L. into geographic races or species. It would seem unrealistic, nevertheless, when a wider area is considered, not to recognize such a seemingly clear-cut geographical race as e.g. *C. Beeringianum*, which in the western North American Arctic appears to be a perfectly distinct species, and only where its range overlaps that of the eastern *C. alpinum* may it at times be difficult to separate the two. An equally good case may be made for *C. arcticum* Lge. if that name is applied to the high-arctic, densely tufted, narrow-sepalled Greenland plant illustrated in Fl. Dan., p. 2963, figures 1-3. In the same plate Lange unfortunately added a fourth plant (figure 4) from Iceland (*C. Edmondstonii* (Wats.) Murb. & Ostf. of Atlantic N.W. European range), thereby causing much confusion and uncertainty as to which plant should correctly bear the name *C. arcticum*.

Lange, l.c., considered his new species identical with the alpine Scandinavian plant, which by Scandinavian writers (Hartman, N. M. Blytt, a.o.) has been called *C. latifolium*, and unfortunately illustrated that plant with a specimen from Iceland (figure 4). Murbech and Ostenfeld, in Bot. Notiser, 1898, p. 246, not realizing that two species were involved, reduced *C. arcticum* Lge. to synonymy, taking up an older name *C. Edmon[d]-stonii* (Wats.) Murbech & Ostenfeld, based on *C. latifolium β. Edmon[d]-stonii* Wats. apud Edmondston, Fl. Shetl., p. 29 (1845), for which the range given was: Spitsbergen, Greenland, Iceland, Faroe Islands, Shetland Islands, and Scandinavia. Ostenfeld, in 1898, according to Gelting (1934), annotated specimens in Herb. Haun. from which Fl. Dan. Tab. 2963 were drawn "*C. Edmon[d]stonii*", but later changed his mind, for in a paper "The Origin of the Flora of Greenland" published in 1926, he included neither *C. Edmondstonii* nor *C. arcticum*, and in the Herb. Haun. personally changed all Greenland specimens thus named to *C. alpinum*.

Some recent Scandinavian writers have followed Murbech and Ostenfeld in taking up *C. Edmondstonii* (Axel Blytt, Lid, a.o.), but others (O. Dahl, Samuelsson, Hultén, a.o.) have retained *C. arcticum* Lge. for the Scandinavian plant. Lately Hultén, in the Fl. Alas. and Yukon, pp. 662-3,

1944, has complicated matters further by maintaining that the Alaskan plant which he considers *C. arcticum*, "agrees so well with Scandinavian specimens of *C. arcticum* [*C. Edmondstonii*] that I must regard them as belonging to one species", as do "similar specimens from N.W. Greenland and the Arctic American Archipelago and also from St. Lawrence Bay in Chukch Penins. (leg. Kjellman)". Although there can be little doubt that *C. arcticum*, as illustrated in Fl. Dan. 2963, figures 1-3, occurs in N.W. Greenland and the Canadian Arctic Archipelago, it seems more than doubtful if any of the Alaska specimens that Hultén referred to *C. arcticum* Lge. are correctly placed there. Of those thus listed or annotated by Hultén l.c., the following: Alaska: St. Matthew Island, Aug. 10, 1891, Macoun (CAN, No. 19583 sub 2); Collinson Pt. (Lat. 70° N., 145° W.), Johansen, No. 124; Yukon: last island in Klondike River, Aug. 5, 1902, Macoun (CAN, No. 58399) (all of which are in the National Herbarium of Canada), certainly should be referred to *C. Beeringianum*. All are loosely tufted and many-flowered and do not answer the epithets "densely tufted", "low-grown", and "few-flowered" called for in Hultén's key (p. 661) for *C. arcticum*.

In the Eastern Canadian Arctic and probably also in N.W. and N. E. Greenland, *C. arcticum* may intergrade with *C. alpinum*, but in the Western Canadian Arctic, where no *C. alpinum* is found, no intermediate forms occur. A careful study is needed of material grown from seed or from transplants, under controlled light and temperature, before a proper understanding can be reached of the range of variation within *C. alpinum*, *C. arcticum*, *C. Beeringianum*, and *C. Regelii*.

Cerastium arcticum is a pronounced calciphile, which shows preference for moist clay spots in rocky limestone barrens.

Arctic Am. Range: Arctic Archipelago to N.E. and N.W. Greenland, north beyond lat. 83° N. Spitsbergen (?).

Cerastium Beeringianum Cham. & Schlecht.

C. alpinum, Simmons, 1913, p. 77, in part.

C. Fischerianum, Simmons, *ibid.*, 78.

Banks Island: De Salis Bay, Manning and Macpherson, No. 32; noted at Cape Lambton; Sachs Harbour, No. 17515; Storkerson Bay, *idem*, No. 122; Cape Crozier, *idem*, No. 151; Castel Bay, Manning and Sparrow, No. 172; Russell Point, Nos. 17670 and 17672. Victoria Island: Read Island; Wollaston Peninsula; Holman Post, No. 17280; head of Minto Inlet, No. 17386; *ibid.*, Anderson (Kew!); Richard Collinson Inlet, Jenness, No. 16. Prince Patrick Island: MacDonald, No. 96.

As elsewhere, the pubescence and the degree of glandulosity is somewhat variable but all have the relatively small flower and narrow rather attenuate, dark purple and scarious margined sepals that distinguishes *C. Beeringianum* from *C. alpinum* and its varieties.

Arctic Am. Range: Common from Bering Strait east over Great Bear Lake, Coronation Gulf, and Bathurst Inlet to Baffin Island and Labrador, north to lat. 76° 30′ in the western Archipelago, south to James Bay, Gulf of St. Lawrence, and Newfoundland. East of Coronation Gulf, where its range overlaps that of *C. alpinum*, the two species are sometimes difficult to separate (Compare Polunin, 1940). Lacking in Greenland.

Cerastium Regelii Ostf.—Simmons, 1913, p. 79.

C. alpinum f. *pulvinata*, Simmons, Fl. Ellesmerel., p. 121.

Banks Island: Bernard Island, No. 17748; lake about 50 miles south of Mercy Bay, Nos. 17737-8; Russell Point, No. 17671. Not seen in the southern parts of Banks Island nor in Victoria Island, although it undoubtedly occurs in the northern parts of that island. Prince Patrick Island: Mould Bay, MacDonald, No. 97. Melville Island: Ross (acc. to Simmons); Winter Harbour, McMillan, CAN, No. 77280. Isachsen Island: Heywood, No. 6. Prince of Wales Island: Fortier, No. 40. Cornwallis Island: H. B. Collins, Nos. 132f, 146, and 200. Boothia Peninsula, Fortier, No. 49. Axel Heiberg Island, No. 18658. King William Island (acc. to Ostenfeld and Simmons).

Cerastium Regelii is quite common in northern Banks Island where it is restricted to wet and low-lying areas along lake shores and on snowbeds. The season of 1949 was a very late one, and although many hundreds of habitats were examined, in no one did the writer succeed in finding flowering or fruiting specimens either of the year or from past seasons.

Simmons (1913), and Polunin (1940) likewise, failed to find flowering specimens. Specimens from King William Island (Ostenfeld, 1909) and, recently, some collections from the west coast of Baffin Island have well-developed flowering axes and last year's fully developed capsules (Foxe Basin, Prince Charles Island, Baldwin, Nos. 1902, 1934, and 1953; west coast of Baffin Island, Kokdjuak River, Manning, No. 155). These are all somewhat stouter than the flowering plant illustrated by Ostenfeld (l.c., tab. II, figure 11) and superficially resemble *C. trigynum* Vill. The flowering axes are decumbent or ascending, 15 to 20 cm. long, with internodes from 5 to 8 cm. long. The inflorescence consists of from 1 to 4 flowers on 1 to 4 cm. long, finely pubescent peduncles; the sepals are soft pubescent, about 5 mm. long, greenish purple, two-thirds as long as the shallowly notched petals. Last year's mature and dehisced capsules (Baldwin, No. 1953) are 10 mm. long and contained no seed. Judged from Scholander's discussion of the nomenclature and taxonomic status (Scholander, 1934), the plant occurring in Spitsbergen is the densely pulvinate form. His figure 14 shows the densely imbricated leaves, so characteristic in this form, and also that it, at least occasionally, produces flowers. Gelting (1934) has given a detailed account of the ecology and vegetative reproduction of *C. Regelii* in N.E. Greenland and in figure 7 has mapped its distribution. Flowering specimens are shown in his figure 6.

Although in the Canadian Arctic Archipelago *C. Regelii* is perhaps most often caespitose (*C. alpinum* f. *pulvinata* Simm.), it develops long, widely trailing stems, if the habitat is sufficiently wet, in which the internodes may be over 2·0 cm. long. This form is totally glabrous and always sterile; the stems may be partly entwined among hygrophilous mosses and algae. Vegetative reproduction from axillary and terminal leaf-buds is abundant.

Arctic Am. Range: High-arctic circumpolar (?), from northern Banks Island across to northern Archipelago to northern and northeastern Greenland, south to King William Island and northern and western Baffin

Island. Thus far not recorded from W. Greenland nor from Alaska, although in the Gray Herbarium there is a specimen collected by Blaisdell at Cape Nome, which Ostenfeld has annotated *C. Regelii*.

Sagina intermedia Fenzl.

Banks Island: Bernard Island, No. 17747; Russell Point, No. 17677. Victoria Island: Prince Albert Sound, on gravelly river-bank, No. 17439; Holman Post; head of Minto Inlet on alpine slope, No. 17388.

Perhaps common on damp sandy and clayey soil, such as lake shores and beaches above the highest tide-mark. New to the western Arctic Archipelago.

Arctic Am. Range: Circumpolar. In Arctic North America from Bering Strait to E. and W. Greenland north at least to lat. 82° 29′ N., south to Cape Jones in James Bay.

Arenaria humifusa Wahlenb.

Although *Arenaria humifusa* has not as yet been collected in the western islands of the Archipelago, it undoubtedly occurs there, because it is found on the adjoining mainland, and in the Eastern Arctic it is known from a number of stations in Baffin Island, Boothia Peninsula, Cornwallis Island, and southern Ellesmere Island.

North Am. Range: From Alaska to Newfoundland and W. Greenland, north to southern Ellesmere Island, south in the Canadian Rockies at least to lat. 50°.

Arenaria peploides L. var. **diffusa** Hornem.

Honkenya peploides, Simmons, 1913, p. 82.

Banks Island: De Salis Bay, Manning and Macpherson, No. 29; Ballast Beach, Miertsch. (Kew!); Mercy Bay; Russell Point. Victoria Island: Read Island; Holman Post; head of Minto Inlet, No. 17383; *ibid.*, Anderson (Kew!); Cambridge Bay. King William Island: 5th Thule Exp., No. 1045.

Perhaps common everywhere on sandy beaches.

Arctic Am. Range: Along the arctic seashore from Alaska to Labrador, north to northern Banks and Baffin islands. Central and southern E. and W. Greenland.

Arenaria Rossii[1] R. Br.—Simmons, 1913, p. 81.

Minuartia Rolfii Nannf. in Nytt Mag. f. Bot. 3 : 159-170 (1954).

Banks Island: De Salis Bay, Manning and Macpherson, No. 16; Cape Lambton, No. 17554; Sachs Harbour; Bernard Island, No. 17745; Russell Point, No. 17667. Victoria Island: Wollaston Peninsula,

[1]According to J. A. Nannfeldt, l.c., *Arenaria Rossii* R. Br., in Richardson, App. to Franklin Narr. 1st Journ. p. 738 (1823), was based on a dwarf form of *Minuartia stricta* (Sw.) Hiern. (*A. uliginosa* Schleich.), and the well-known arctic plant is, therefore, without a legitimate name. Fortunately, there is no need for discarding the well-known *A. Rossii*, for although the Richardson specimen seen by Nannfeldt may be *A. uliginosa*, there is in the British Museum (Natural History) a sheet from Richardson's Herbarium that in Richardson's handwriting is labelled "Arenaria Rossii Br.—Coast". This sheet contains 6 well-preserved specimens of typical *A. Rossii*, all showing the densely caespitose habit so characteristic of that species. All are richly flowering, the uppermost bearing 50-odd fully expanded flowers; in addition, all show abundant leafy buds, formed in the leaf-axils.

No. 17216; 30 miles north of head of Albert Sound, No. 17384; Holman Post No. 17278. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville Island.

A pronounced calciphile, which is occasional to common in moist gravelly places in open tundra. In 1949, *A. Rossii* had only reached the flowering stage toward the end of the season and undoubtedly did not mature seed. In the Far North this species perhaps rarely produces seed, depending largely on vegetative reproduction by leafy buds formed in the leaf-axils.

General Range: From Bering Strait through arctic and alpine parts of Alaska and Yukon, across the Arctic Archipelago and northernmost mainland of Northwest Territories, northernmost Greenland to N.E. Greenland, south to northernmost Ungava, and through the Canadian Cordillera to mountains of Washington, Oregon, Wyoming, and Colorado. Also in Spitsbergen.

Arenaria rubella (Wahlenb.) Sm.

A. verna, Simmons, 1913, p. 81.

Banks Island: De Salis Bay, No. 17619; *ibid.*, Manning and Macpherson, No. 34; Cape Lambton, No. 17555; Sachs Harbour, No. 17514; Russell Point, No. 17668. Victoria Island: Read Island, No. 17193; Wollaston Peninsula, No. 17217; Holman Post, No. 17279; head of Prince Albert Sound, No. 17438; head of Minto Inlet, No. 17385; Washburn Lake, No. 17457. Prince Patrick Island: Mould Bay, MacDonald, Nos. 92-3; Melville Island (acc. to Simmons); same place, McMillan, CAN, No. 77312. King William Island: Gjøa Exp.; same place, Larsen, No. 15. Axel Heiberg Island: No. 18655.

Common in sandy and gravelly places and in open clay in frost-heaved tundra, as well as in the peaty soil of owl perches.

Arctic Am. Range: Circumpolar. Arctic and subarctic from Alaska to E. and W. Greenland, north across the Arctic Archipelago to beyond lat. 80° N., south to South Dakota, the Great Lakes, and Gaspe.

Arenaria sajanensis Willd.

Banks Island: Cape Lambton, No. 17556; Sachs Harbour. Victoria Island: Noted at Holman Post.

Rare and occasional in herbmats on south-facing slopes.

Arctic Am. Range: Circumpolar. From Alaska and Yukon to Gaspe, Labrador, southern and central Baffin Island, and W. and E. Greenland, south through the Canadian Rockies at least to Crowsnest Pass.

Silene acaulis L. var. **exscapa** (All.) DC.—Simmons, 1913, p. 83; Macoun & Holm., 1921, p. 11.

Banks Island: De Salis Bay, Manning and Macpherson, No. 33; Mercy Bay, Anderson (Kew!); *ibid.*, Manning and Sparrow, No. 198. Victoria Island: Read Island; Wollaston Peninsula; Holman Post, No.

17282; Minto Inlet; Prince Albert Sound, Anderson (Kew!). King William Island, Gjøa Exp.; also Larsen, No. 16. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville and Axel Heiberg islands (acc. to Simmons).

Occasional to common, in rocky places.

Arctic Am. Range: Almost circumpolar arctic alpine. From Alaska through Yukon to E. and W. Greenland, north to 83° N., south to mountains of New Hampshire in the East and at least to mountains of Alberta and British Columbia in the West. In Alaska, Yukon, and the Cordillera, also the ssp. *subacaulescens* (Williams) Fern.

Melandrium affine (J. Vahl) Hartm.—Simmons, 1913, p. 84.

Lychnis affinis, Macoun & Holm, 1921, p. 11.

Banks Island: De Salis Bay, No. 17621; Nelson Head, No. 17781; Cape Lambton, No. 17557; Sachs Harbour; Russell Point, No. 17673. Victoria Island: Read Island; Wollaston Peninsula (Nos. 658 and 658a, C.A.E.!); Holman Post, No. 17281; head of Minto Inlet. No. 17387; Cambridge Bay, Anderson (Kew!). Melville and Axel Heiberg islands (acc. to Simmons). Axel Heiberg Island: No. 18659. King William Island: Larsen, No. 14.

Rare to occasional on rocky ledges and on owl perches.

Arctic Am. Range: An arctic American species extending from Alaska through Yukon and arctic Canada to northern E. and W. Greenland, north to 83 degrees, south to Churchill, Cape Jones, and northern Labrador.

Melandrium apetalum (L.) Fenzl. ssp. **arcticum** (Fr.) Hult.

Lychnis apetala var. *arctica* Macoun & Holm, 1921, p. 11.

Melandrium apetalum, Simmons, 1913, p. 83.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 24 and 40; Cape Lambton, Nos. 17558-9; Sachs Harbour; Storkerson Bay, Manning and Macpherson, No. 123; Cape Crozier, *idem*, No. 152; Mercy Bay, Manning and Sparrow, No. 197; Russell Point, Nos. 17674-6. Victoria Island: Read Island; Wollaston Peninsula (C.A.E. No. 657!); Holman Post; Minto Inlet (also Anderson, Kew!); Walker Bay, No. 17491; Cambridge Bay, (Anderson, Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 13, 98, 99, and 100. Melville Island (acc. to Simmons) and McMillan, CAN, No. 77302. King William Island (acc. to Simmons) and Larsen, No. 13. Prince of Wales Island: Fortier, No. 65. Axel Heiberg Island: Mokka Fd., No. 18660.

Common and widespread in wet tundra and in moist, gravelly places.

As pointed out by Hultén, Fl. Alas. and Yukon, pp. 700-701 (1944), the plant that in the N. American Arctic has passed for *M. apetalum* (or *Lychnis apetala*) clearly belongs to a circumpolar, arctic race, ssp. *arcticum*, distinguished by its always nodding flowers and by the well exserted, deeply notched, dark purple petals. Typical *M. apetalum* as found in mountains of Lapland is a more robust plant; its petals are always included, and its flowers nearly always erect, on stiff and stout peduncles.

Arctic Am. Range: High-arctic or alpine. From Alaska, northern Mackenzie, and Keewatin to northern Ungava, south to the shores of Hudson Bay, northern W. and E. Greenland, north to lat. 83°.

Melandrium Ostenfeldii Porsild in Sargentia 4: 37 (1943). *See* Porsild, Nat. Mus. Canada Bull. 121 : 173 (1951) tab. XIV.

Victoria Island: Dry, rocky slopes, Walker Bay, No. 17492. My specimens on August 25 had fully matured capsules and are a close match for the plant originally described from Great Bear Lake where it has been collected repeatedly.

General Range: Thus far known only from Great Bear Lake, Mackenzie Delta, Victoria Island, mountains of southeastern Yukon and northern Alaska.

Melandrium triflorum (R. Br.) J. Vahl.

Banks Island: Cape Crozier, Manning and Macpherson, No. 153. Prince Patrick Island: Mould Bay, MacDonald, No. 14. Axel Heiberg Island: Mokka Fd., Nos. 18661-3. Ellesmere Island: Slidre Fd., Tener, No. 62; same place, Troelsen, No. 46; Ravine Bay near Alert Bay, MacDonald, No. 23.

Melandrium triflorum, long considered an endemic of north Greenland, from time to time has been recorded from Ellesmere Island, but according to Simmons (1906) these earlier records have all been erroneous. More recently, Polunin (1940), although apparently still with some doubt, under *Lychnis triflora* reported two collections from the central east coast of Baffin Island.

The specimens in the present series, together with recent collections from Baffin Island (Wynne-Edwards), are inseparable from the Greenland plant.

General Range: Northern E. and W. Greenland across the northern islands of the Arctic Archipelago, south to central Baffin Island.

RANUNCULACEAE

Caltha palustris L. var. **arctica** (R. Br.) Huth.—Simmons, 1913, p. 85.

Banks Island: Cape Lambton; Russell Point, flowering on August 20, No. 17679. Victoria Island: Holman Post; Minto Inlet, Anderson (Kew!); head of Minto Inlet; Cambridge Bay, Anderson (Kew!); south coast, Rae, (Kew!). Melville Island (acc. to Simmons) and also McMillan, CAN, No. 77306. King William Island: Larsen, No. 20.

Our plant is the extreme arctic race, var. *arctica*, which, by its growth habit, slender decumbent or trailing stems, small leaves with open sinuses, and pale flowers no more than 1·5 cm. in diameter, seems amply distinct from the western ssp. *asarifolia* (DC) Hult.

General Range: Arctic eastern Siberia, along the arctic coast of Alaska, Yukon, and Mackenzie District, east to King William Island, north to Melville Island (type locality), and south to central Keewatin. Lacking in the eastern Canadian Arctic and in Greenland. It is of interest to note that in the East *C. palustris* extends north only to James Bay and the Gulf of St. Lawrence.

Pulsatilla ludoviciana (Nutt.) Heller

Banks Island: Masik Valley, Manning and Macpherson, No. 5. Flowering specimens on June 25.

The occurrence in Banks Island of this Cordilleran foothill species is interesting and unexpected, since otherwise it barely enters the arctic zone along the Arctic Coast east and west of the Mackenzie Delta.

General Range: Dry calcareous plains and foothills from interior Alaska and Yukon, east to Great Bear and Great Slave lakes, Manitoba, and Wisconsin, south through the Rocky Mountain foothills to Montana and Colorado.

Anemone parviflora Michx.—Macoun & Holm, 1921, p. 12.

A. Richardsonii, Simmons, 1913, p. 85, in part.

Banks Island: Cape Lambton, No. 17561; 15 miles up Nelson Head River, Manning and Macpherson, No. 1; 15 miles up Sachs River, *idem*, No. 7. Victoria Island: Wollaston Peninsula (also C.A.E., No. 653!); Holman Post, No. 17287; Minto Inlet, Anderson (sub *A. Richardsonii*, Kew!); head of Minto Inlet, No. 17389; Cambridge Bay; south coast, Rae (Kew!).

A subarctic species, which in our area is restricted to calcareous southern and favoured exposures. On August 8 it was still in full bloom at Holman Post.

General Range: An American subarctic species that from E. Asia ranges across the N. American subarctic to Labrador and Newfoundland, north to southern Banks and Victoria islands, south to the Gulf of St. Lawrence, Lake Superior, and in the Cordillera to North Dakota, Colorado, Idaho, and Oregon. Lacking in Baffin Island and Greenland.

Anemone Richardsonii Hook.—Simmons, 1913, p. 85, pro min. pte.

Victoria Island: south coast, Rae (Kew!).

On the strength of Simmons' report (*see* under *A. parviflora*) I searched for *A. Richardsonii* in Banks and Victoria islands, but without success. When, in 1950, in the Kew Herbarium I examined the actual specimens cited by Simmons, it appeared that first Hooker and later Simmons misidentified the rather poor specimens of *A. parviflora*, collected by Anderson at Minto Inlet, as *A. Richardsonii*. It seems likely, therefore, that the unverified M'Clure record of *A. Richardsonii* from Banks Island (Prince of Wales Strait) likewise was based on *A. parviflora*.

On another sheet in Kew Herbarium, labelled *A. Richardsonii*, are five plants collected by Rae on the south shore of Victoria Island; four are clearly *A. Richardsonii* and the fifth is *A. parviflora*.

A subarctic species that generally grows in leaf-mould among willows in well-sheltered places.

General Range: From eastern Asia across subarctic and boreal N. America to northern Ungava, north to Coppermine River and southern Victoria Island, south to Richmond Gulf and York Factory; rare in the Canadian Cordillera south to about lat. 54° N. Lacking in Baffin Island but with a few stations in S.W. Greenland.

Ranunculus Cymbalaria Pursh var. **alpinus** Hook.

Victoria Island: Holman Post, No. 17288. Common locally in heavily manured grassy places, where it had not yet reached anthesis on August 8.

The var. *alpinus* appears to be a rather well-defined subarctic littoral race, which from eastern Asia (*R. salsuginosus* Pall.), with numerous large gaps, extends along the arctic coast of Alaska and Canada to southern Labrador and the Gulf of St. Lawrence; it is lacking in Baffin Island and the northern Hudson Bay region but has a few isolated stations in S.W. Greenland.

Ranunculus Cymbalaria is new to the flora of the Archipelago but in view of its littoral and chamaephytic habit may have been accidentally introduced by Eskimo and their dogs.

Ranunculus Gmelini DC.

(Plate XV, figures 1-11)

Banks Island: Russell Point, sterile specimens on floating aquatic mosses in a pond with *R. hyperboreus*, No. 17680A. Victoria Island: Head of Prince Albert Sound, floating sterile specimens in a shallow pond among *Arctophila fulva*, No. 17440.

Ranunculus Gmelini is new to the flora of the Arctic Archipelago where, under present climatic conditions, it probably flowers and fruits only in exceptional seasons.

Arctic Am. Range: An Asiatic species that extends from Bering Strait through northern Alaska, Yukon, and the Mackenzie, east to the west coast of Hudson Bay, north to the arctic coast of Yukon and Mackenzie, Banks and Victoria islands.

Ranunculus hyperboreus Rottb.— Simmons, 1913, p. 86.

Banks Island: Russell Point, No. 17680. Victoria Island: Holman Post; head of Minto Inlet, No. 17390. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Fruiting specimen, July 17, 1952, MacDonald, No. 104. Melville Islands (acc. to Simmons, l.c.). Axel Heiberg Island: Head of Mokka Fd., No. 18730.

General Range: Circumpolar, across arctic and subarctic North America, south to southern Labrador, northern Hudson Bay, rare in the Canadian Rockies south to about lat. 52° N. In Greenland north to lat. 83° N.

Ranunculus nivalis L.— Simmons, 1913, p. 87.

Banks Island: Cape Lambton, No. 17562; Russell Point, No. 17681. Victoria Island: Holman Post, No. 17289; head of Minto Inlet, No. 17391. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, flowering specimens, June 30, MacDonald, No. 105. Melville Island (acc. to Simmons, l.c.). Bathurst Island: Jenness, No. 5.

General Range: Circumpolar arctic-alpine, across arctic North America from Alaska to northern E. and W. Greenland, south to northern Ungava and east coast of Hudson Bay, south to Richmond Gulf but apparently absent in Keewatin. In the Rocky Mountains replaced by the closely related *R. Eschscholtzii.*

Ranunculus pedatifidus Sm. var. **leiocarpus** (Trautv.) Fern.

R. affinis, Simmons, 1913, p. 88; Macoun & Holm, 1921, p. 13.

Banks Island: De Salis Bay, No. 17623; Cape Lambton, No. 17563; Sachs Harbour, No. 17316; Mercy Bay, Miertsch. (Kew!); Russell Point, No. 17682. Victoria Island: Wollaston Peninsula, C.A.E., No. 654; Read Island; head of Prince Albert Sound, No. 17441; Holman Post; Minto Inlet, Anderson (Kew!); Cambridge Bay (Kew!). Melville Island (acc. to Simmons, l.c.). Axel Heiberg Island: Head of Mokka Fd., Nos. 18668-70.

Ranunculus pedatifidus is strongly nitrophilous and in Banks and Victoria islands is rarely seen except on owl perches and below bird cliffs.

General Range: *R. pedatifidus, s. lat.,* is circumpolar arctic-alpine, in North America extending from Bering Strait across the Arctic Archipelago, north to lat. 80° N., south to islands in James Bay and northern Ungava, in the west far southward in the Cordillera. Northern and central E. and W. Greenland.

Ranunculus pygmaeus Wahlenb.—Simmons, 1913, p. 86.

Banks Island: Cape Lambton, No. 17564. Victoria Island: Holman Post; south coast, Rae (Kew!); Cambridge Bay; 60 miles north of Cambridge Bay, No. 17474.

A snow-bed species which in our area is occasional to common by alpine brooks and in moist clayey places.

General Range: Circumpolar arctic-alpine. In North America from Bering Strait east to E. and W. Greenland, north beyond lat. 80°, south to northern Ungava and Hudson Bay, and in the Rocky Mountains south to Wyoming.

Ranunculus Sabinei R. Br.—Simmons, 1913, p. 86.

Banks Island: Cape Crozier, Manning and Macpherson, No. 154; Mercy Bay, Manning and Sparrow, No. 201; Russell Point, luxuriant specimens, 10 cm. tall, growing on owl perch, No. 17683. Prince Patrick Island: Mould Bay, MacDonald, Nos. 16, 106-7. Melville Island: (Type locality); also McMillan, CAN, No. 77284. Prince of Wales Island: Fortier, No. 35. Isachsen Island: Heywood, Nos. 8, 9; same place, July, 1948, Innis Taylor. Axel Heiberg Island: Head of Mokka Fd., No. 18732.

To the excellent description and notes on the ecology of *R. Sabinei* given by Simmons (Fl. Ellesmerel., 1906, pp. 111-114) may be added that *R. Sabinei* is a pronounced calciphile and strongly nitrophilous. It is one of the earliest species to flower, and specimens in full bloom have been collected in Prince Patrick Island on June 28, and at Slidre Fd., Ellesmere Island, on June 23.

General Range: High arctic N. American endemic, apparently common in the northern islands of the Archipelago, from Banks Island to N.W. Greenland, north to the northern tip of Ellesmere Island, south to the arctic coast of Alaska and the Mackenzie District.

Ranunculus sulphureus Sol.—Simmons, 1913, p. 87.

(Map, fig. 6, p. 39)

Banks Island: north shore, M'Clure (Kew!); Cape Crozier, Manning and Macpherson, Nos. 155-6; Castel Bay, Jenness, No. 63; Mercy Bay, Miertsch. (Kew!), Manning and Macpherson, No. 202; Russell Point, No. 17684; lake 50 miles south of Mercy Bay, No. 17739. Prince Patrick Island: Mould Bay, MacDonald Nos. 15, 108-9. Melville Island (acc. to Simmons); *ibid.*, McMillan, CAN, Nos. 77295-6; *ibid.*, Jenness, No. 25. Axel Heiberg Island: Head of Mokka Fd., No. 18731.

Arctic Am. Range: Circumpolar, high-arctic. Shores of Bering Sea and Strait and north coast of Alaska; thus far not recorded from Yukon, Mackenzie, and Keewatin districts, but from nearly all islands of the Arctic Archipelago, northern Ungava, and northern Hudson Bay; in E. and W. Greenland between lat. 67°–83° N.

PAPAVERACEAE

Papaver Keelei Porsild, in Nat. Mus. Canada Bull. 101 : 20, Plate XVI, figs. 4-7 (1945).

P. ? *Macounii* var. *discolor* Hult., Fl. Alas. & Yukon, p. 803 (1945).

Banks Island: Nelson Head, Manning and Macpherson, No. 76; Sachs Harbour, Manning and Sparrow, No. 240; west coast, Storkerson Bay, *idem*, No. 125.

P. Keelei is at once distinguished from *P. radicatum* by its dark green, spreading leaves; tall, slender, and mostly solitary scapes, and narrow capsules terminating in a conical stigma. Its ecological preference is for calcareous, rather wet, turfy tundra or muskeg, whereas *P. radicatum* grows in dry, gravelly or sandy places.

The type locality of *P. Keelei* is in alpine muskegs of the Mackenzie Mountains. In addition, it is known from mountains of the Mackenzie Valley, from Richardson Mountains west of the Mackenzie Delta, and from Brooks Range, the arctic coast of Alaska, and from Banks Island.

Papaver radicatum Rottb.—Simmons, 1913, p. 88.

(Map, fig. 19)

In the Canadian Arctic, as noted by Simmons (1906, pp. 99-101), Polunin (1940), and others, *Papaver radicatum* varies very considerably in regard to shape, incision, and pubescence of leaves, length and pubescence of the scape, size of the flower and the colour of its petals. Although Polunin (1940) found that these characters "all vary within wide limits", and "...often quite independently of one another" when a large material is examined, certain combinations of characters can nevertheless be recognized. Some of them appear to be fairly consistent, and when studied in the field those having several such characters in common generally prove also to have similar and often rather distinct ecological requirements. Simmons (l.c.) thus noted that one "small form" with "small pale yellowish, or even quite white flowers" was restricted to wet clay plains. The colour of the petals *per se* does not, however, seem to be of diagnostic value, for in Banks and Victoria islands the writer noted that in the form growing in wet clay plains, white-flowered plants growing side by side with yellow-flowered ones could not be distinguished from one another once the petals had dropped. He noted, on the other hand, that when specimens from different ecological environments were examined, the pubescence of the scapes were dense, dark, and spreading in some, whereas in others it was sparse, pale, and appressed. A distinct relationship could also be observed between growth habit, shape, colour, incision of leaves, pubescence of scapes, flower size, and colour of the petals. In the northern islands of the Archipelago is found another "race" that forms small, low, and few-flowered tufts, with short-petiolate, sparingly hirsute to glabrate, glaucous green, not deeply incised leaves. The flowers are 3 to 4 cm. in diameter with yellow or salmon pink petals, drying yellow.

On the basis of such combination of characters, it may be possible to recognize within the Canadian Arctic Archipelago four "races" of *P. radicatum*, each with a rather distinct geographical range. Furthermore, according to chromosome counts undertaken by Professor C. A. Jørgensen, Copenhagen, from specimens grown from seed supplied by the writer, one of these races appears to be hexaploid, whereas another is octoploid. Unfortunately, no chromosome counts are as yet available for the remaining two races of *P. radicatum*, or for *P. alboroseum*, *P. alaskanum*, *P. Keelei*, *P. McConnellii*, *P. Macounii*, *P. nudicaule*, or *P. Walpolei*.

The more significant among the 200-odd specimens of Canadian Arctic *Papaver radicatum* in the National Herbarium of Canada are currently being studied by Professor Jørgensen, who for some time has been engaged in a cyto-taxonomic study of *Papaver radicatum*. Pending the publication of his results, *Papaver radicatum* is here considered in a broad sense. Its Canadian range based on specimens in the National Herbarium of Canada is given in figure 19.

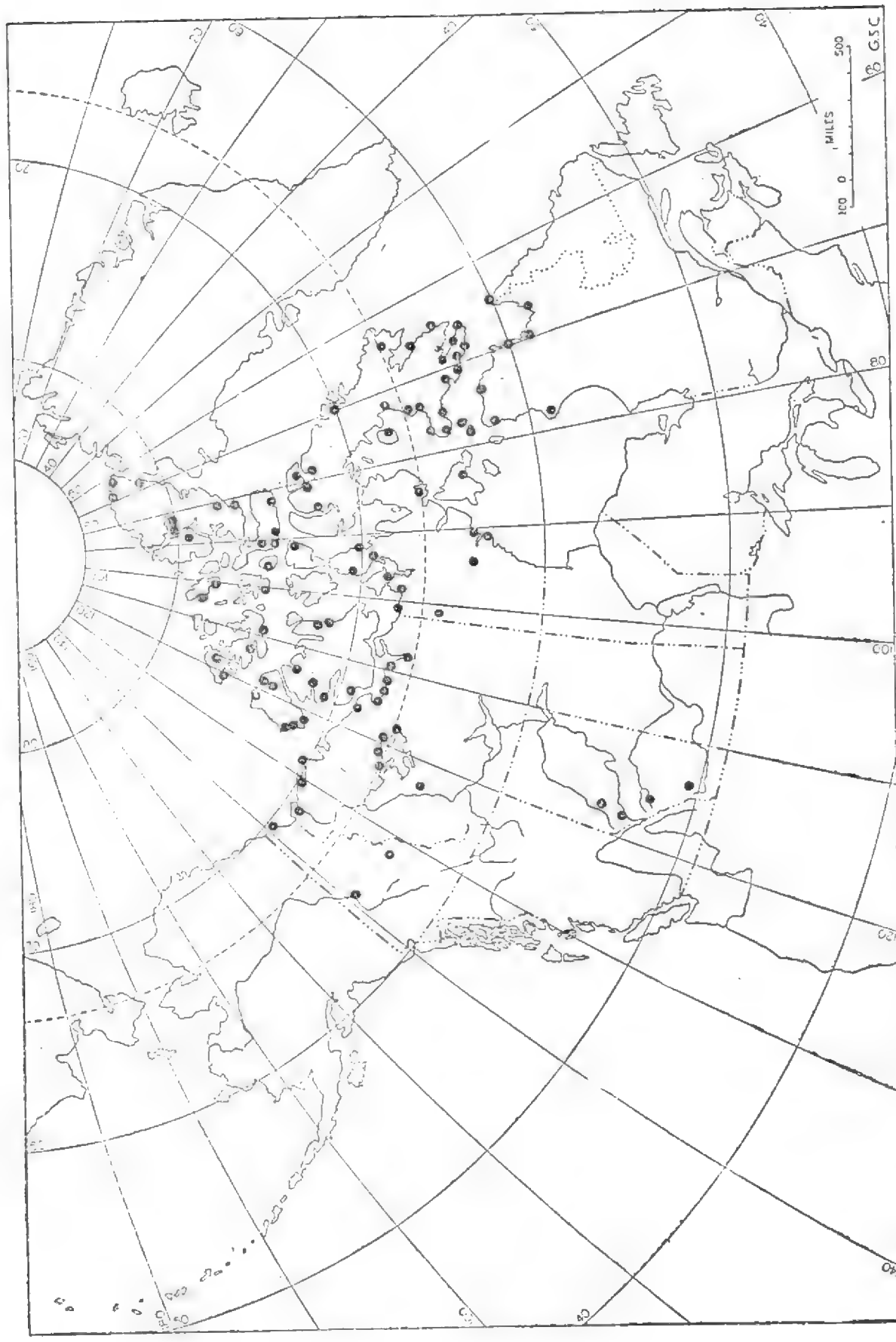

Figure 19. Range of *Papaver radicatum* Rottb., s. *lat.*, in Canada.

CRUCIFERAE

Cochlearia officinalis L. ssp. **arctica** (Schlecht.) Hult.

C. officinalis, Simmons, 1913, p. 89.

Banks Island: De Salis Bay, Manning and Macpherson, No. 59; Nelson Head, *idem*, No. 96; summit of plateau between Nelson Head and Masik Pass, elevation 1,900 to 2,400 feet, No. 17773; Cape Lambton, No. 17568; Bernard Island, No. 17750; Cape Crozier, Manning and Macpherson, No. 158; Castel Bay, Manning and Sparrow, No. 173; Mercy Bay, *idem*, Nos. 204-5; Mercy Bay, Miertsch. (Kew!); Russell Point, 20 miles inland, in springy places, 500 feet above sea-level, No. 17689. Victoria Island: Read Island; Holman Post; Prince Albert Sound; Minto Inlet and Cambridge Bay, Anderson (Kew!); lake north of Cambridge Bay, No. 17475. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 120-1. Melville Island: Winter Harbour, McMillan, CAN, Nos. 77279, 77288, and 77303. Axel Heiberg Island: Head of Mokka Fd., elevation 2,200 feet, No. 18675.

Although generally halophytic and littoral, *Cochlearia officinalis* ssp. *arctica* is frequently found throughout the Arctic Archipelago far inland and at considerable elevations above present sea-level. Thus, on Banks Island it was collected at 2,400 feet near Nelson Head, and on Axel Heiberg Island it grew abundantly in moist tundra not far from the ice-cap at an elevation of 2,200 feet.

The occurrence of this and other littoral species in the Arctic Archipelago, far from the seashore and at considerable elevations above present sea-level, must be considered in the light of the considerable and rapid postglacial emergence and uplift, which is known to have occurred throughout the Arctic Archipelago.

The species is strongly nitrophilous and frequently grew on owl perches.

General Range: Circumpolar-arctic. In North America from Bering Strait along the Arctic Coast to E. and W. Greenland, north beyond lat. 83° N., south to northern Hudson Bay and Ungava.

Eutrema Edwardsii R. Br.—Simmons, 1913, p. 90.

Banks Island: De Salis Bay, Manning and Macpherson, No. 53; Cape Lambton, No. 17577; Sachs Harbour, No. 17519; Russell Point. Victoria Island: Holman Post, Nos. 17304-6; Minto Inlet, Anderson (Kew!); head of Minto Inlet; head of Prince Albert Sound; Cambridge Bay, Anderson (Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, No. 133. Melville Island (type locality) and King William Island.

Occasional to common in tundra; the species is a pronounced calciphile and also a decided dung-lover, as shown by its luxuriant growth below bird cliffs and near Eskimo camp-sites.

General Range: Circumpolar high-arctic–alpine, in North America from Alaska to E. and W. Greenland, north across the Arctic Archipelago to beyond lat. 83° N., south to northern Ungava and the northern Hudson Bay region.

Descurainia sophioides (Fisch.) O. E. Schulz

Banks Island: Sachs Harbour, Manning and Macpherson, No. 113. Victoria Island: Holman Post; Cambridge Bay, No. 17469; *ibid.*, Fortier, No. 27. At Holman Post the species was common on refuse heaps near the village.

A weedy species, which no doubt is frequently dispersed by man.

General Range: Arctic and subarctic E. Asia and western America, east to the west coast of Hudson Bay, south to Lake Athabasca and north to Banks and Victoria islands.

Cardamine bellidifolia L.—Simmons, 1913, p. 91.

Prince Patrick Island: Mould Bay, MacDonald, Nos. 116-7. Melville Island: Winter Harbour, McMillan, CAN, No. 77503.

Although noted in Fl. Bor.-Am. as occurring "throughout Arctic America sparingly", no specimens could be found in the Kew Herbarium to substantiate this claim. In fact, there appears to be a broad gap separating the American western and eastern population of *C. bellidifolia*. Thus, in the West, *C. bellidifolia* from Bering Strait extends through Alaska and Yukon to the Mackenzie River, southward on high mountains of the Cordillera to Washington and Oregon. The eastern population extends from east Greenland across the northernmost islands of the Archipelago to Melville Island, north beyond lat. 83° N., west to Bathurst Inlet, south to central Keewatin and the west coast of Hudson Bay, northern Ungava, and the southernmost part of Greenland, with isolated stations in Gaspe and on high mountains of Maine and New Hampshire.

Although looked for assiduously, *C. bellidifolia* was not seen in Banks or Victoria islands, nor has the writer detected it during many seasons of collecting in the Mackenzie Delta, along the Arctic Coast, or in the Great Bear Lake region.

Cardamine digitata Richards.

C. hyperborea, Simmons, 1913, p. 91.

Banks Island: Nelson Head, Manning and Macpherson, No. 91; Sachs Harbour; Storkerson Bay, Manning and Macpherson, No. 126; Castel Bay, Manning and Sparrow, No. 126; Mercy Bay; *ibid.*, M'Clure (Kew!); Russell Point. Victoria Island: Wollaston Peninsula; Prince Albert Sound; Holman Post, Nos. 17293-4; head of Minto Inlet, No. 17393; Cambridge Bay; *ibid.*, Anderson (Kew!); south coast, Rae (Kew!).

Occasional to common in moist, grassy places. *Cardamine digitata*, like *Eutrema Edwardsii*, is a pronounced dung-lover and in well-manured places may form dense, lush green turf. In such places the leaflets of the basal leaves may become 5 mm. wide.

Geographical Area: Apparently an endemic of arctic N.W. America and extreme East Asia. In America, it reaches from Alaska to the west coast of Hudson Bay, north across the westernmost islands of the Archipelago.

Cardamine pratensis L var. **angustifolia** Hook.—Simmons, 1913, p. 90.

Banks Island: Nelson Head, Manning and Macpherson, No. 111; Cape Lambton; Russell Point, No. 17688. Victoria Island: Head of Prince Albert Sound, No. 17442; Holman Post; Cambridge Bay, No. 17468. King William Island. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 118-9.

Occasional to common in marshy places and on lake shores. Our specimens all belong to the arctic race, var. *angustifolia* Hook., which in the Canadian Arctic replaces the species.

Geographical Area: *C. pratensis, s. lat.*, is circumpolar. The var. *angustifolia*: Arctic-alpine parts of North America, from the north coast of Alaska to E. Greenland in Ellesmere Island, north to lat. 82°, south to James Bay and the Gulf of St. Lawrence.

Lesquerella arctica (Wormskj.) Wats.—Simmons, 1913, p. 91.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 38 and 65; Cape Lambton; Sachs Harbour, No. 17520; Mercy Bay; Russell Point, No. 17699. The last number, by its lepidote siliques, simulates ssp. *Purshii* but in all other respects is typical *L. arctica*. Victoria Island: Read Island, No. 17199; Wollaston Peninsula; Holman Post; Walker Bay, No. 17494; Minto Inlet, No. 17402; *ibid.*, Anderson (Kew!); inland sand plain 60 miles north of Cambridge Bay, No. 17476. Melville Island (Kew!).[1] King William Island: Gjoa Haven, Larsen, No. 28.

Common in sandy and gravelly places.

Geographical Area: American Arctic from Bering Strait along the Arctic Coast across the Arctic Archipelago to northern E. and W. Greenland, where it extends south to about lat. 70° N.; on the Canadian mainland south over Great Bear Lake to northern Hudson Bay and Strait region with isolated stations at Churchill, Manitoba, and at Rama in northern Labrador. Disjunct in northern Siberia about long. 110° E. and lat. 67° N.

In mountains of central Alaska, Yukon, the northern Canadian Cordillera, and disjunct in Newfoundland and Anticosti Island, the ssp. *Purshii* is distinguished by smaller lepidote siliques, complete and rarely perforated septum, and narrower, slender-petioled leaves (*See* Porsild, Nat. Mus. Canada Bull. 121:191-2 (1951)).

Draba alpina L.—Simmons, 1913, p. 94.

Banks Island: De Salis Bay, No. 17628; Mercy Bay; Ballast Beach, Miertsching (acc. to Simmons). Victoria Island: Wollaston Peninsula, No. 17220; interior plains north of head of Prince Albert Sound; west end of Tahoe Lake, No. 17454; Richard Collinson Inlet, Jenness, No. 19. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

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[1]No collector's name is given for the single Melville Island specimen at Kew, which once belonged in Herb. Trevelyan. Inasmuch as no *Lesquerella* is listed by Brown (l.c.) for Melville Island, the specimen probably was obtained by some expedition other than Parry's.

On snow-beds in moist tundra, by brooks and lake shores and in wet clay, but much less common than *Dr. Bellii.* The present series is rather uniform and represents more or less typical *Dr. alpina* (*See* Gelert, figure 11, 1898) as exemplified by loosely caespitose growth, hirsute scapes, golden yellow petals, and glabrous siliques. The leaves are long-ciliate, the upper surface glabrous or sparingly hirsute with the lower surface covered by long and loose, repeatedly branched trichomes. The midrib is prominent only in the lower half of the leaf.

Geographical area: Circumpolar arctic-alpine. In North America from Bering Strait along the Arctic Coast to central E. and W. Greenland, north to southern Ellesmere and Melville islands, south to northern Ungava and the west coast of Hudson Bay.

Draba Bellii Holm

Dr. alpina Simmons, 1913, p. 94, in part.

(Plate XVI)

Banks Island: De Salis Bay, dry tundra flat, No. 17629; same place, Manning and Macpherson, No. 74; trap-rock cliffs near Cape Lambton, No. 17569; summit of Nelson Head, elevation 2,400 feet, No. 17774; Sachs Harbour, Manning and Sparrow, No. 235; west coast near Storkersen Bay, Manning and Macpherson, No. 127; Bernard Island, No. 17751; Cape Crozier, Manning and Macpherson, No. 159; Castel Bay, Manning and Sparrow, No. 175; Mercy Bay, *idem*, No. 206; Russell Point, Nos. 17690-3. Victoria Island: Read Island, No. 17197; Wollaston Peninsula, No. 17219; *ibid.*, C.A.E. No. 651; head of Minto Inlet, No. 17394. Prince Patrick Island: Mould Bay, MacDonald, Nos. 20, 122-4. Melville Island: McMillan, CAN, Nos. 77286 and 77278. Bathurst Island: Jenness, No. 6. Prince of Wales Island: Guillemard Inlet, Fortier, No. 72. King William Island: Gjoa Haven, Larsen, Nos. 34, 35; *ibid.*, Fortier, No. 88; *ibid.*, July 1904, Godfred Hansen. Axel Heiberg Island: Diana Lake, Nos. 18676-7 and 18687.

Although some students of arctic *Drabae* have expressed grave doubt with regard to the specific status of *Dr. Bellii* Holm as distinct from *Dr. alpina* L., most of those who have had experience with it in the field agree that the plant which Holm described from a specimen collected by R. Bell on Mansel [Mansfield] Island in Hudson Strait is amply distinct from *Dr. alpina* L. The type (CAN, No. 61525) is in the National Herbarium of Canada and is the fruiting specimen from which Holm drew the plate that accompanied J. M. Macoun's list of Melville Island plants (Macoun, 1910). El. Ekman (1931) gives a fuller description of *Dr. Bellii*, based upon the much larger material seen by her, and (l.c. tab. V, figure 4) shows a photograph of the type and (l.c. figure 1, p. 471) a detailed drawing showing leaf and hair structure. Scholander (1934, pp. 34-35) discusses the Spitsbergen plant and in his excellent photograph, figure 11, shows a leaf and hair structure of that plant.

Despite El. Ekman's comprehensive studies in the genus *Draba*, in which she has brought together the original descriptions of a number of little known species, besides redescribing what she considered the types of many obscure species, the nomenclature of North American arctic, yellow-flowered, scapose *Drabae* is still far from clear. Thus, after

showing that *Dr. Bellii* is not synonymous with *Dr. macrocarpa* Adams, Mrs. Ekman herself admits the presence of the latter species in arctic North America, a suggestion that Hultén (1941–50, p. 868) has taken up. However, on phytogeographic grounds alone, the occurrence in the Hudson Bay region of the Siberian *Dr. macrocarpa* would be most difficult to explain. A considerable number of Asiatic and Beringian species, over unglaciated northern Alaska and Yukon, extend east to the Mackenzie, but very few have crossed that important phytogeographical boundary and a still smaller number have reached the Arctic Archipelago. *Dr. Bellii*, on the other hand, is widely distributed throughout the Arctic Archipelago, where it is easily the most common *Draba*. Together with *Kobresia hyperborea*, *Ranunculus Sabinei*, *Oxytropis arctica*, *Pedicularis arctica*, *Artemisia hyperborea*, and *Taraxacum hyparcticum*, to mention only a few, *Draba Bellii* belongs in a group of plants that survived the Pleistocene or perhaps evolved in the unglaciated part of the Archipelago and from there spread to the arctic mainland. A few species belonging in this group have reached northern Alaska and Yukon, and several, including *Dr. Bellii*, northern Greenland and Spitsbergen.

As noted by Sørensen (1937, p. 42), the ecology of *Dr. Bellii* is quite distinct from that of *Dr. alpina*; the latter is not calcicolous and is an obligate snow-bed plant, whereas *Dr. Bellii* is decidedly calcicolous and generally grows in dry, rocky, and exposed places, often completely lacking in winter snow cover. When well developed, *Dr. Bellii* forms large cushions, sometimes with 50 or more flowering scapes. The colour of the petals varies from dilute to bright yellow but fades in age to a creamy yellow; in *Dr. alpina* the petals are of a deeper yellow and do not fade. The young ovaries of *Dr. Bellii* are glabrous but soon become covered by almost sessile, forked hairs. Seed production is abundant. The shape of the mature siliques varies somewhat; those of the typical plant (f. *typica*) by Mrs. Ekman, l.c., are said to be "suborbiculatae-oblongo-ovatae", as distinguished from var. *gracilis* Ekm., in which the siliques are "ovatae-oblongo-ovatae, acuminatae". Although some eastern plants may have slightly broader and less acute siliques averaging 5 x 9 mm., plants with slightly narrower (4 x 9 mm.) and therefore slightly more acute siliques are by far the most numerous throughout the Canadian Arctic.

Distribution: From the Mackenzie Delta north across the Arctic Archipelago beyond lat. 83° N., east along the Arctic Coast to northern Hudson Bay region, northern E. and W. Greenland south to lat. 70° N.; Spitsbergen.

Draba cinerea Adams.

Dr. hirta, Simmons, 1913, p. 92, in part.

Banks Island: De Salis Bay, No. 17630; Cape Lambton; Sachs Harbour, No. 17518. Victoria Island: Read Island, No. 17196; Wollaston Peninsula, Nos. 17221 and 17223; head of Prince Albert Sound; Holman Post, Nos. 17295-6; Minto Inlet, Anderson (Kew!); head of Minto Inlet, Nos. 17395-6; Cambridge Bay, Anderson (Kew!); south coast, Rae, (Kew!).

An examination of the rapidly increasing collection of North American arctic *Draba* in the National Herbarium of Canada clearly shows that material generally referred to in the past as *Dr. cinerea* includes at least

two easily recognized entities, each with a distinct geographical range. Thus, *Dr. cinerea* s. str., as circumscribed by El. Ekman (1929), in North America is a continental, subarctic rather than high-arctic species that, north of the mainland, extends only to the southernmost islands of the Arctic Archipelago. The plant found in the northern islands, generally passed as *Dr. hirta* or *Dr. hirta* var. *arctica* (Simmons, 1906 and 1913) or as *Dr. cinerea* (Polunin, 1940), differs by its lower and more compact growth; the branches of the multicipital caudices are short and crowded as are their leaves, which on both surfaces are shaggy from a mixture of stellate and rather coarse, variously forked and simple hairs, quite unlike the uniformly short, densely stellate-pannose indument of the leaves in typical *Dr. cinerea*. In both plants the valves of the siliques are densely stellate pubescent even in the early state, and as pointed out by Ekman (l.c.) the seeds of the high-arctic plant are slightly larger than those of *Dr. cinerea* s. str.

This northern plant obviously is *Dr. groenlandica* Ekm., which by her has actually been reported from Ellesmere Island and from the northern Hudson Bay region (*see* below).

Dr. cinerea is a decidedly calcicolous species often growing in exposed, gravelly, or rocky places.

Distribution: Probably of circumpolar range but in North America remarkably rare in Alaska and Yukon but common in the Palaeozoic region of subarctic-arctic Canada from the Mackenzie to northern Hudson Bay, south to mountains of S.E. Yukon and northern British Columbia, north to southern islands of the Archipelago, central and northern E. and W. Greenland.

Draba glabella Pursh.

Dr. hirta, Simmons, 1913, p. 92, in part.

Banks Island: Noted at Cape Lambton and Russell Point. Victoria Island: Read Island; Holman Post, No. 17300; Minto Inlet, Anderson (Kew!); head of Minto Inlet; Cambridge Bay, Fortier, No. 26; south coast, Rae (Kew!). King William Island: Gjoa Haven, Larsen, No. 51. Melville Island (acc. to Simmons, but probably *Dr. groenlandica*).

Occasional to common in moist, turfy places by brooks, lake shores, and below bird cliffs.

Geographical Area: Circumpolar, arctic-subarctic. In North America from Bering Strait to central E. and W. Greenland, north across the southern islands of the Archipelago to lat. 75° N., south to Gaspe, Hudson Bay, and Slave Lake.

Draba groenlandica Ekm.

Dr. hirta var. *arctica*, Simmons, 1906.

Dr. hirta, Simmons, 1913, p. 92, in part.

Dr. hirta f. *rupestris*, Ostenfeld, 1910, p. 14.

Dr. nivalis, Macoun & Holm, 1921, p. 13, in part.

Banks Island: De Salis Bay, Manning and Macpherson, No. 51; Cape Lambton, No. 17573; Sachs Harbour, Manning and Sparrow, No. 237; Cape Crozier, Manning and Macpherson, No. 160; Castel Bay, Jenness,

No. 55; *ibid.*, Manning and Sparrow, No. 176; Mercy Bay, on slide rock at foot of cliff, No. 17752; Russell Point, No. 17694. Victoria Island: Wollaston Pen., C.A.E., No. 652; head of Minto Inlet, No. 17397. King William Island: Gjoa Haven, Larsen, No. 52. Prince Patrick Island: Mould Bay, MacDonald, Nos. 22 and 125. Melville Island: Winter Harbour, McMillan, CAN, No. 61527, and Anderson, No. 62542. Axel Heiberg Island: Diana Lake, head of Mokka Fd., Nos. 18678-83. Ellesmere Island: Slidre Fd., Tener, Nos. 70, 75, and 76; *ibid.*, Troelsen, No. 56. Baffin Island: Admiralty Bay, Malte, CAN, No. 118924; Cape Dorset, Polunin, No. 2357. Foxe Basin: Prince Charles Island, Baldwin, No. 1890. Arctic Mainland: Bernard Harbour, C.A.E., Nos. 299 and 312a.

As noted under *Dr. cinerea*, *Dr. groenlandica* is a high-arctic species, which, with *Dr. Bellii* and many others, belongs in a group of species endemic to the Arctic Archipelago. *Dr. Ostenfeldii* Ekm., which is another segregate from *Dr. cinerea*, like *Dr. groenlandica*, has been reported from Ellesmere Island where, according to Ekman (1929), it was collected by Simmons in Goose Fd. (Simmons, Nos. 2894 and 2889) and in Hayes Sound (Simmons, Nos. 4198 and 656). Without access to the specimens cited above and in the absence of other authentic material of *Dr. Ostenfeldii*, the writer is unable to determine the relation of that specimen to the series cited above under *Dr. groenlandica*.

Dr. groenlandica, like *Dr. cinerea*, is strongly calcicolous and grows in exposed, gravelly, and rocky places.

Distribution: From Banks Island across the Arctic Archipelago to north E. and W. Greenland.

Draba lactea Adams

Dr. fladnizensis, Simmons, 1913, p. 93.

Dr. fladnizensis var. *heterotricha*, Am. auctt.

Banks Island: Cape Lambton, Nos. 17570-2; Mercy Bay, No. 17753; *ibid.*, Manning and Sparrow, No. 207; Ballast Beach, Miertsch. (Kew!); Russell Point, Nos. 17695-6. Victoria Island: Holman Post, Nos. 17297-9; head of Minto Inlet, Nos. 17398-9; Prince Albert Sound, Miertsch. (Kew!); south coast, Rae, 1851 (Kew!); Cambridge Bay, Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, Nos. 21, 126-8. Melville Island (acc. to Simmons). King William Island: Larsen, No. 33. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Head of Mokka Fd., No. 18684.

Occasional to common in wet mossy tundra and by brooks. In our area, perhaps the earliest flowering *Draba*; in Prince Patrick Island flowering specimens were collected on June 30, 1952.

Geographical Area: Circumpolar, high-arctic. In North America from Bering Strait across to E. and W. Greenland, north across the Archipelago to beyond lat. 80° N. in Ellesmere Island; south to northern Ungava, Labrador, the shores of Hudson Bay, and in the west to high mountains of Yukon and northern British Columbia.

Draba nivalis Liljebl.—Simmons, 1913, p. 94; Macoun & Holm, 1921, p. 13.

Banks Island: De Salis Bay; Cape Lambton, No. 17574; Russell Point. Victoria Island: Wollaston Peninsula (acc. to Macoun and Holm, but no specimen in the National Herbarium of Canada); Holman Post, Nos. 17301-2. Melville Island (acc. to Simmons). King William Island: Gjoa Haven, 5th Thule Exp., No. 1233; Larsen, No. 32.

Occasional to rare on rocky ledges and on cliffs.

Geographical Area: Circumpolar (with large gaps in Siberia) arctic-alpine. In North America from Bering Strait to E. and W. Greenland, north in Ellesmere Island beyond lat. 80° N., south to Newfoundland, Gaspe, and the shores of Hudson Bay.

Draba oblongata R. Br.

Dr. corymbosa R. Br., Brown, 1819.

Dr. micropetala Hook., Hooker, 1830.

Dr. alpina var. *oblongata* (R. Br.) Gelert, Simmons, 1906, p. 81.

Dr. alpina, Simmons, 1913, p. 94, in part.

(Plate XVII)

Prince Patrick Island: Mould Bay, flowering and fruiting specimens in deep wet moss below a large snowdrift, July 4 and August 12, 1952, MacDonald, Nos. 129 and 130. Isachsen Island: July 16-30, 1948, Innis Taylor; in gravelly clay near weather station, Heywood, No. 11. Cornwallis Island: Resolute Bay, in deep wet moss, Collins, Nos. 148, 187, 187A and B. Ellesmere Island: Craig Harbour, Malte, CAN, Nos. 118892 and 118905; Bedford Pim Island, Simmons, No. 443 (O); Hayes Fd., Simmons, No. 1381 (O); Fram Harbour, Simmons, No. 291 (O); Slidre Fd., Tener, No. 71. Greenland: Etah, David C. Nutt, No. 58; North Star Bay, Ekblaw, No. 417.

Gelert (1898) deserves much credit for attempting to bring order into the chaotic condition in which the North American arctic *Drabae* were left by Hooker (1830). The task that he had set himself, however, was an extremely difficult one, partly because Gelert had had no personal experience with the species in the field and partly because much of the material upon which some of the species were founded was sparse and often incomplete. For these reasons some of his deductions must be considered inconclusive. Simmons (1906), who, in addition to considerable field experience in Ellesmere Island, Greenland, and Spitsbergen, had himself examined all the significant material in London, in dealing with the arctic scapiform species, largely accepted Gelert's conclusion that *Dr. oblongata* is merely a variety of the polymorph *D. alpina* (*Dr. alpina* var. *oblongata* (Hook.) Gelert) "distinguished by a strong and dense hair-covering but not sharply defined from the main form". Having examined the type of *Dr. micropetala*, Simmons (l.c.) again agreed that this, likewise, must be referred to *Dr. alpina*, whereas the var. β, based upon a Richardson collection from the "Sea coast between the Coppermine and Mackenzie Rivers", was a clear-cut and distinct species, which he named *Dr. subcapitata*. About the correctness of the latter conclusion there can be no doubt, and

Dr. subcapitata Simm. has since become universally accepted by students of arctic *Drabae*, of which, as pointed out by Simmons, it may well be "the best defined".

The conclusion reached by Gelert and Simmons with regard to *Dr. oblongata* and *Dr. micropetala* was questioned by Ekman (1931). It is not quite clear, however, whether she considered both distinct or if she thought that both names had been applied to the one and the same plant. Nor is it certain to what extent her concept of them was based upon what she considered the type specimens in London, or upon fresher and better material from Spitsbergen, Novaya Zemlya, or arctic Siberia, where, according to her and also to Scholander (l.c.), Tolmachev (1939), and Hadăc (1944), one or both species occur. At any rate, under *Dr. micropetala* Hook. she cited Gelert's (l.c., figure 12) showing *Dr. oblongata* drawn from "a specimen from Spitsbergen collected by Jørgensen".

The type of *Dr. corymbosa*, and also *Dr. oblongata*, was first collected during Ross' 1st voyage, probably at Possession Bay (Bylot Island), and was published by name only (Brown, 1819). Brown's remark (l.c.) that it is very similar to *Dr. oblongata*, and the full description given five years later in DeCandolle's Prodromus, vol. 1, p. 169: "26. *D. corymbosa* (Brown! in Ross. voy. Baffin bay. app.) scapis nudis hispidulis, foliis dense caespitosis oblongis basi attenuatis ciliatis subhispidisque, siliculis ellipticis corymbosis hispidulis. 2l in American bor. Flores ignoti. Siliculae ellipticae stylo brevissimo et stigmate .subcapitato terminatae. DC. syst. 2. p. 343. (v.s. in h. Banks.)" shows that it must be very close, if indeed not identical, to *Dr. oblongata*; it seems quite obvious, therefore, that the "*Cochlearia*" specimen in the British Museum, which, according to Th. Fries (1873), and later Gelert (l.c.), is labelled "*Dr. corymbosa*" in Brown's hand, could not possibly be the plant from which DeCandolle's description was drawn.

While a re-examination of the alleged types of *Dr. oblongata* and *Dr. micropetala* could scarcely be expected to throw new light on the identity of these plants, a comparison of the descriptions as given by Hooker, l.c., of *Dr. oblongata*, *Dr. corymbosa*, and *Dr. micropetala* clearly shows that they all refer to a caespitose plant or plants with entire, lanceolate-oblong ciliated leaves with simple or forked hairs, hirsute scapes, and elliptic-oblong and hirsute siliques. *Dr. micropetala* is said to have white petals, but *Dr. oblongata* and *Dr. corymbosa* obviously were in the fruiting stage, for they are said to have pubescent siliques, which in the latter are described as "corymbose".

Ostenfeld (1923), quoting Gelert's figure 12, accepted the plant here discussed as a "good and easily distinguished *Draba*, which can not be reduced to a variety of *D. alpina*", known to him from the north coast of Greenland and from Spitsbergen, Novaya Zemlya, and Franz Joseph Archipelago. For this plant he took up *Dr. Adamsii* Ledeb. in Fl. Ross, 1 : 147 (1842), rejecting both *Dr. oblongata* and *Dr. micropetala*. Since Ostenfeld cited no actual specimens, it is impossible to determine the relation of his *Dr. Adamsii* to our plant; it may be significant, however, that he expressly stated that so far as he could determine, *Dr. Adamsii* did not occur in Arctic America.

The recent collection listed above from the Canadian Arctic are all remarkably uniform and clearly represent a clear-cut species allied to *Dr. alpina*, from which it differs by its creamy white petals and corymbose, pilose siliques. From *Dr. subcapitata* our plant differs by its broadly elliptic-lanceolate, thin and not prominently keeled leaves, and by its pubescent siliques. The series includes specimens in varying states of development, among which it would be easy to select individual plants perfectly matching the original descriptions of *Dr. oblongata*, *Dr. corymbosa*, and *Dr. micropetala*, respectively. *Dr. micropetala* Hook. is antedated by *Dr. oblongata* and *Dr. corymbosa*. Since in Brown's list *Dr. oblongata* precedes the latter, it must be selected as the only valid name for our plant.

Dr. oblongata is probably endemic to arctic North America and N.W. Greenland; at any rate the writer has seen no material from arctic Europe or Asia that completely matches our plant. Certainly the *Dr. oblongata* illustrated by Tolmachev (1939, tab. xxiii, figure 6) bears no resemblance to our plant. Scholander's photograph of a Spitsbergen specimen of *Dr. oblongata* (1934, figure 12) shows a very different kind of pubescence; it seems equally clear that the *Dr. leptopetala* illustrated by Busch (1913, p. 312), which according to Tolmachev (l.c.) is *Dr. micropetala*, is not our plant.

Draba oblongata grows in damp moss on snowbeds and along brooks.

Distribution: Endemic to northern islands of the Arctic Archipelago and northernmost Greenland.

Draba subcapitata Simm.—Simmons, 1913, p. 94.

Dr. lapponica, sensu R. Br., 1824, p. 266.

Banks Island: Cape Lambton, Nos. 17573 and 17575; Mercy Bay, No. 17754; *ibid.*, Miertsch. (Kew!); Russell Point, Nos. 17697-8. Victoria Island: Wollaston Peninsula, No. 17224; head of Minto Inlet; Washburn Lake, No. 17458; Greely Haven, Fortier, No. 95. Prince Patrick Island: Mould Bay, MacDonald, No. 131. Melville Island: Winter Harbour, Parry's 1st Voy. (Kew!) and McMillan, CAN, No. 77285; J. C. Anderson, CAN, No. 77292a. King William Island: Gjoa Haven, Larsen, No. 31. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Hyperite Point (acc. to Simmons); head of Mokka Fd., No. 18686.

Occasional in rocky places, in dry turfy tundra, and on owl perches.

Geographical Area: Amphi-Atlantic–high-arctic. From Banks Island to northern E. and W. Greenland, north beyond lat. 83° N., south to shores and islands of Foxe Basin. Spitsbergen and Novaya Zemlya. Thus far, it has not been collected in Alaska, Yukon, or elsewhere on the mainland.

Arabis alpina L.—Simmons, 1913, p. 96.

By some curious *lapsus* J. M. Macoun (1910) recorded *Arabis alpina* among plants collected by J. G. McMillan at Winter Harbour, Melville Island. The specimen on which the report was based is in the National Herbarium of Canada, but, as clearly shown by the label, it was collected by McMillan on September 16, 1909, not at Winter Harbour, but at Point Burwell in Labrador where the species is common.

Arabis arenicola (Richards.) Gelert—Simmons, 1913, p. 95.

Victoria Island: South coast, Rae (acc. to Simmons, l.c.).

Simmons, l.c., reported seeing the Rae specimens in the Kew Herbarium, and Hooker (1830) cited specimens collected by Richardson, Franklin, and Back in "deep sand upon the shores of Arctic America between long. 107° and 150° W."

Hopkins (1937) questioned the correctness of Hooker's report and stated that the Muir specimen from Golovnin Bay, Alaska, and also Greely's from Grinnel Land, both cited in Gray's Syn. Fl. N. Am. 1:137 (1895), were misidentified by Watson.

In the course of many years of collecting east and west of the Mackenzie Delta, I have never succeeded in rediscovering *Arabis arenicola*, nor did I find it in Banks and Victoria islands in 1949. Furthermore, a careful search in the London herbaria failed to bring to light either the Rae specimen, or indeed any Canadian specimens of *A. arenicola* from west of longitude 95° N.

Although Simmons undoubtedly was very familiar with *A. arenicola*, which he himself collected in Ellesmere Island, I am forced to the conclusion that somehow he was mistaken about the Rae specimen—a contention that gains support from the fact that no *Arabis* is mentioned in Hooker's list of Rae's plants where the only two *Cruciferae* listed are *Draba incana* and *Erysimum cheiranthoides*. In 1855, Rae collected plants at Repulse Bay where *A. arenicola* is common. Possibly the specimen that Simmons saw came from there.

Geographical Area: E. and W. Greenland, northern Ungava and southern Baffin Island, north to Ellesmere Island, shores of Hudson Bay and Keewatin, with an isolated station on Athabasca Lake, west to upper Back River, lat. 65° 23′ N., long. 105° 30′ W.

Erysimum Pallasii (Pursh) Fern.

Hesperis Pallasii, Simmons, 1913, p. 96.

Banks Island: De Salis Bay, Manning and Macpherson, No. 52; Masik Valley, *idem*, No. 3; Cape Lambton, on talus below sea-gull cliff, No. 17576; Sachs Harbour, Manning and Sparrow, No. 234; Mercy Bay, on rocky scree, No. 17755 (f. *humilum*); Prince of Wales Strait, 20 miles south of Russell Point, No. 17767. Victoria Island: Read Island, No. 17198; Holman Post, No. 17303; head of Minto Inlet, Nos. 17400-1; Minto Inlet, Anderson (Kew!); south coast, Rae (Kew!). Melville Island: By Simmons erroneously said to have been reported by Macoun (1910) from Winter Harbour. While we have no actual specimens from that island, the species undoubtedly occurs there. Axel Heiberg Island: Head of Mokka Fd., Nos. 18688 and 18690.

Erysimum Pallasii is strongly favoured by dung and animal refuse and was often seen on owl perches, below bird cliffs, and near human habitation. The showy, bright purple flowers are very fragrant, but of scarcely less striking appearance are fruiting plants with their dark purple, stiffly erect siliques, up to 11 cm. long. The low and sometimes quite "stemless" f. *humilum* (Tolm.) Polunin is generally found in exposed places or on sterile soil.

North Am. Range: From N.W. Alaska across Arctic Archipelago to N.W. Greenland south to north Baffin Island and Great Bear Lake and in the Canadian Rocky Mountains to lat. 52° N.

Braya humilis (C. A. Mey.) Robins. ssp. **arctica** (Böcher) Rollins, Rhod. 55 : 115 (1953).[1]

Torularia humilis (C. A. Mey.) Robins. ssp. *arctica* Böcher, Medd. o. Grl. 147,7 : 29 (1950).

Braya alpina, Macoun & Holm, 1921, p. 13, not Sternb. & Hoppe.

B. glabella, Holm, 1922, p. 36, not Richards.

B. humilis, Porsild, 1943, p. 45.

Banks Island: De Salis Bay, dry tundra flat, No. 17624; Sachs Harbour, No. 17517. Victoria Island: Wollaston Peninsula, C.A.E., No. 411 (reported by Macoun & Holm, 1921, as *B. alpina* and by Holm, 1922, as *B. glabella*); dry gravelly slope near Holman Post, Nos. 17291-2; south coast, Rae (Kew!). Ellesmere Island: Fosheim Peninsula on plain covered by glacial till, elevation 500 feet, last year's fruiting axes collected on April 23, 1952, C. Troelsen.

Our plant undoubtedly is identical with *Torularia humilis* ssp. *arctica* Böcher, recently described from the northeast and north coasts of Greenland, and is also the plant found on the arctic coast of the Mackenzie District that the writer (Porsild, 1943) noted differs from *B. humilis* of the Mackenzie River valley and the Canadian Rockies by its "smaller and pure white flowers". Mackenzie Delta: North end of Richards Island, Porsild, Nos. 2228, 2234-5, 16826-7. Arctic Coast: Atkinson Point, *idem*, No. 2622; Cape Dalhousie, *idem*, No. 2761; Liverpool Bay, Nicholson Island, *idem*, Nos. 2890 and 16780; Eskimo Lake Basin, 60 miles east of Tuktuayaktoq, *idem*, No. 16765. Great Bear Lake: North shore of MacTavish Arm, *idem*, No. 5177. Arctic coast between Coppermine and Cape Alexander, Rae (Kew!).

Abbe (1948), in eastern N. America, distinguished six geographical "races" of *Braya humilis*. One of these, known to him only from east Greenland, he separated from the rest by "styles of mature fruits short (0·3 to 0·7, aver. 0·3 to 0·4 mm. long); stigma in fruit not capitate; siliques glabrescent to moderately pubescent, the siliques from 0·9 to 1·2 (aver. 1·0) mm. wide." In the other five, however, including "race" No. 2, known to him only from W. Greenland, "The style of the mature siliques are longer, averaging from 0·7 to 1·0 mm. in length". In comparing the east and west Greenland populations of *B. humilis*, Böcher (1950) agreed that the morphological differences emphasized by Abbe are constant and that, furthermore, the two races have a different ecology. Thus, the east Greenland plant, besides having a distinctly arctic–high-arctic range is markedly xerophytic and grows in exposed, gravelly places, whereas that of the west coast is mesophytic, favouring rather moist, alluvial clay soils, where it is associated with species of subarctic rather than arctic range. In view of its morphological differences and distinct ecological and climatic requirements, Böcher considered the east Greenland plant a well-marked

[1]In Medd. o. Grl., Vol. 136, No. 8, p. 17, 1954 (received after this paper had gone to press) Th. Sørensen has expressed an independent and divergent view on the classification of the eastern North American arctic races of *B. humilis*.

geographical race: ssp. *arctica* Böcher. The rather marked difference in the length of style is shown in Böcher's figure 8 (l.c.), which, however, does not show that in ssp. *arctica* the stigma is distinctly bilobed.

To the morphological differences noted by Abbe (l.c.) and by Böcher (l.c.) should be added that in ssp. *arctica* the pedicels in the mature, fruiting plant are longer and stouter, and inserted on the axis at a more obtuse angle than in other races of *B. humilis*, so that the siliques tend to be more spreading. This difference is more striking than would appear from Böcher's plates Nos. 4 and 5, where the east and west Greenland races are illustrated, but is well brought out by Abbe's plate No. 1089, figure 1, where some of the siliques are distinctly spreading at angles of 45 degrees or over, in the manner of *Arabis lyrata*, to which ssp. *arctica* bears a strong superficial resemblance.

Abbe (l.c.), who dealt only with the eastern North American "races" of *B. humilis*, concluded that between those there is "overlapping of all characters to such an extent that it would be unjustifiable to propose them as varieties or perhaps even as forms." Abbe's race No. 6, and possibly others, extends westward into Mackenzie, Yukon, and possibly Alaska, where other and even more distinct races occur. Among these is the rather distinct *B. Richardsonii* (Rydb.) Fern. (*Arabidopsis Richardsonii* Rydb.) with much-branched, decumbent-ascending stems, grey-canescent and coarsely toothed leaves, pale purple petals, and erect, pubescent, 2 to 3 cm. long siliques with a short coronate style; and *B. humilis* ssp. *ventosa* Rollins recently described from Colorado. The need for a comprehensive study of the races of *B. humilis*, preferably based on specimens grown from seed and under controlled temperature and light, is made still more urgent by Rollins' suggestion that polyploidy is prevalent in the genus, and if coupled with apomictic reproduction, would explain the genetic origin and perpetuation of the divergent and relatively uniform, isolated populations of *B. humilis*.

Geographical Distribution: *Braya humilis, s. lat.:* circumpolar. In North America all "races" are obligate calciphiles, a fact that undoubtedly strongly contributes to their disrupted ranges around the periphery of the acid Precambrian Shield, within which, thus far, no *Braya humilis* has yet been discovered. The ssp. *arctica*: arctic–high-arctic from northeast Greenland over northernmost Greenland, Ellesmere Island, and islands of the Archipelago to the Arctic Coast near the Mackenzie Delta, south to Great Bear Lake.

Braya purpurascens (R. Br.) Bge.—Simmons, 1913, p. 96; Macoun & Holm, 1921, p. 13.

Banks Island: De Salis Bay, in clay spots in dry tundra flat, Nos. 17625-7; *ibid.*, Manning and Macpherson, No. 39; Cape Lambton, steep talus slope, No. 17567; Russell Point, gravelly slope, No. 17687. Victoria Island: Read Island, No. 17195; Wollaston Peninsula, No. 17218; *ibid.*, C.A.E., No. 413; Holman Post, No. 17290; Minto Inlet, Anderson (Kew!); head of Minto Inlet; Walker Bay, Nos. 17493 A and B. Prince Patrick Island: Mould Bay, MacDonald, No. 114. King William Island: Fortier, No. 85. Melville Island (type locality). Axel Heiberg Island: Head of Mokka Fd., No. 18673.

Noted as occasional to common in open calcareous clay in tundra, where it frequently grew in or along the cracks in frost polygons.

The material, as that from elsewhere in the Canadian Arctic, shows very considerable variation as to stature, shape, and degree of pubescence of the siliques, length of style and the length of flowering and fruiting axes; even within the same local population, plants with pubescent siliques are as common as those with perfectly glabrous ones. All specimens from the northernmost islands have short and decumbent stems and may be referred to var. *dubia* (R. Br.) Schulz. No. 17627 from De Salis Bay in Banks Island differs by its short and erect, 3 to 5 cm. long fruiting axes, pubescent leaves, stems, and 5 to 8 mm. long siliques with a short, coronate stigma. The petals are narrow and barely exceed the sepals.

Geographical Area: Circumpolar-arctic but discontinuous. In North America with a gap between Bering Strait and the Mackenzie, thence across the Arctic Archipelago to northern east and west Greenland, south to northern Hudson Bay region and northern Ungava.

Braya Thorild-Wulffii Ostenf. in Medd. o. Grl., 64 : 176 (1923), tab. 3 A, figs. 1-4, and tab. 3 B, figs. 1, 2.

B. purpurascens, Simmons, 1913, p. 96, in part.

Prince Patrick Island: Mould Bay on a dry slope, MacDonald, No. 115. Melville Island: Winter Harbour, McMillan, CAN, No. 77297. Axel Heiberg Island: Diana Lake at head of Mokka Fd., in moist clay soil of stony plain, No. 18674. Ellesmere Island: Slidre Fd., Kelsall, No. 46.

This new material is a perfect match for the description and illustration given by Ostenfeld (1923) and clearly shows that *Braya Thorild-Wulffii* is a high-arctic species, clearly distinct from *B. purpurascens* by its decumbent-ascending, densely crisp-pubescent scapes, its capitate inflorescence, which towards maturity becomes much elongated, and by the densely pubescent siliques, which at maturity average 8 to 9 x 3 to 4 mm., very short style with a bilobed stigma, and by the tardily deciduous sepals and petals. The cytological investigations of Holmen (1952) show that in northernmost Greenland the chromosome number in *B. Thorild-Wulffii* is 2n=28, or half that of *B. purpurascens*. *B. Thorild-Wulffii* thus far has been known only from northeast and north Greenland. The new stations in the Canadian Arctic Archipelago show that its range is continuous across northernmost Greenland and the Arctic Archipelago.

Parrya arctica R. Br.—Simmons, 1913, p. 97.

(Map, fig. 11, p. 44)

Banks Island: De Salis Bay, No. 17631; *ibid.*, Manning and Macpherson, Nos. 55, 67, 73; Nelson Head, Manning and Macpherson, No. 89; Sachs Harbour, No. 17521 (f. *albiflora*); Mercy Bay, Miertsch. (Kew!), Manning and Sparrow, No. 208; Castel Bay, *idem*, No. 177; Russell Point, Nos. 17700-1. Victoria Island: Wollaston Peninsula, No. 17225 (type

of f. *albiflora*) and No. 17226; Holman Post; Minto Inlet, Anderson (Kew!); Walker Bay, No. 17495; Richard Collinson Inlet, Jenness, No. 20; northeast corner of island, *idem*, No. 35; Cambridge Bay, Anderson (Kew!); 60 miles north of Cambridge Bay, No. 17477. Prince Patrick Island: Mould Bay, MacDonald, Nos. 23, 24, 134-5. Melville Island: Winter Harbour, McMillan, CAN, Nos. 77282-3 and 77287. Prince of Wales Island: Fortier, No. 68. King William Island: Gjoa Haven, Larsen, Nos. 29 and 30; Fortier, No. 84. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Parrya arctica is a decided calciphile, which is at home on strongly congeliturbated soils as well as on moderately wet tundra or on well-drained limestone shingle. In Banks and Victoria islands it is undoubtedly the most common representative of the *Cruciferae*. In most places the white-flowered form is as common as the purple-flowered one. The former, which may be designated f. *albiflora*, n. forma (*petala eburnea*), apparently differs only in this character, and the two forms frequently grow together.

The mature siliques are from 1·5 to 3·0 cm. long and 0·3 to 0·5 cm. wide, often more or less torulose and with strongly keeled valves. Each compartment contains from 2 to 3 dark green seeds, each covered by a loose-fitting white testa, which forms a broad wing and makes the seed look as if wrapped in tissue paper. The seeds average 5·5 x 4 mm. (or 3·5 x 2·5 mm. without the wing). Seed formation appears to be normal, although in 1949 only a few plants matured seeds.

Geographical Area: An endemic of the central and western Canadian Arctic Archipelago from Banks, north to Prince Patrick, Melville, and Cornwallis islands, east to Boothia Peninsula and the north tip of Southampton Island, with isolated stations along the mainland coast, Great Bear Lake, and Richardson Mountains, west of Mackenzie Delta.

Parrya nudicaulis (L.) Regel.

P. macrocarpa, Macoun & Holm, 1921, p. 14.

Victoria Island: Wollaston Peninsula, C.A.E., Nos. 412 and 650.

Geographical Area: From arctic Europe and Asia through Alaska and Yukon to the Mackenzie Delta and Mackenzie Mountains. East of the Mackenzie Delta known only from the collections cited above, and from a single collection from Bernard Harbour on the mainland shore of Dolphin and Union Strait.

SAXIFRAGACEAE

Saxifraga aizoides L.—Simmons, 1913, p. 101.

Banks Island: Cape Lambton. Victoria Island: Wollaston Peninsula; Holman Post; Minto Inlet, Anderson (Kew!); head of Minto Inlet; interior north of Prince Albert Sound. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Occasional to rare in Banks and Victoria islands where it appears to be restricted to the area of volcanic trap rock. As pointed out by Polunin (1940), *S. aizoides* is an obligate calcicole, and this may to some extent account for its somewhat erratic distribution.

Geographical Area: Arctic-alpine, amphi-Atlantic. In North America from Banks and Victoria islands over Ellesmere to east and west Greenland; south to the Gulf of St. Lawrence, Newfoundland, and mountains of northern Vermont and west New York, James Bay, Great Slave Lake, and in Rocky Mountains to lat. 50° N.; also in Iceland, Spitsbergen, Novaya Zemlya, arctic and alpine parts of continental Europe but apparently lacking throughout Asia and Alaska.

Saxifraga caespitosa L. ssp. **uniflora** (R. Br.) Porsild, n. comb.

S. uniflora R. Br. in Suppl. to App. to Parry's Voy., p. 275 (1824).

S. groenlandica var. *uniflora*, Simm., 1913, p. 104.

(Plates XVIII; and XIX, figures 1 and 2)

Banks Island: Noted at Cape Lambton; Mercy Bay, Manning and Sparrow, Nos. 209, 210; Cape Crozier, *idem*, No. 161; Castel Bay, *idem*, No. 179, and Jenness, No. 59; Russell Point, No. 17708. Victoria Island: Read Island, No. 17201; Holman Post, No. 17308; head of Prince Albert Sound, No. 17444; Cambridge Bay, Anderson (Kew!). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince Patrick Island: Mould Bay, MacDonald, Nos. 25, 136-8. Melville Island: McMillan, CAN, Nos. 77276-7. Prince of Wales Island: Fortier, Nos. 36 and 70. Isachsen Island: Heywood, No. 12. Bathurst Island: Aime, No. 6; Jenness, No. 8. Axel Heiberg Island: Diana Lake, Nos. 18692-4.

The ssp. *uniflora* is the only race of *S. caespitosa* thus far collected in the western islands, where it is occasional but never abundant in rocky and gravelly places. It is an obligate calcicole and strongly nitrophilous and is frequently found near the beach or near owl perches and animal burrows or near the nesting sites of birds. Ssp. *uniflora*, like the other races of *S. caespitosa*, varies considerably according to habitat and exposure; thus, in shaded ravines or among stones in rocky screes, where the snow remains late, its flowering stems may be 10 to 12 cm. high and occasionally 2- to 3-flowered when, invariably, the lateral flowers are long-peduncled and smaller than the terminal flower. In exposed places the flowers barely emerge above the surface of the small, compact tussock. In ssp. *uniflora* the hypanthium, sepals, and flowering peduncles are dark purple and so glandular that dust particles, sand, or even gravel or small insects frequently become imbedded. Seed production appears to be regular and abundant, even under unfavourable conditions. Flowering continues until onset of winter.

Saxifraga caespitosa ssp. *exaratoides* (Simm.) Engl. & Irmsch.[1] apparently is a race that is endemic to the Hudson Bay region where it grows chiefly on limestone rocks. It extends north to southern Ellesmere Island, but thus far has not been collected in the western islands. It differs from ssp. *eucaespitosa* Engl. & Irmsch. and other eastern races of *S. caespitosa* by its small flowers, which are usually densely aggregated in a head-like inflorescence. Engler & Irmscher (l.c.) erroneously identified Simmons' plant with *Muscaria monticola* Small and other Cordilleran races of *S. caespitosa*.

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[1] *Saxifraga caespitosa* L. ssp. *exaratoides* (Simm.) Engl. & Irmsch. in Pflanzenr. iv. 117.1:375 (1916), as to type only: Ellesmere Island: In scopulosis ad Falcon Cliff (lat. 76° 29′, long. 88° 40′) sinus Goose Fjord. 21/7 1901, Simmons, No. 2870 (Herb. Oslo and Kew!).

S. groenlandica L. ssp. *exaratoides* Simm., Fl. Ellesmercl., 1906, p. 73, tab. 7, figs. 1–5.

General Range of ssp. *uniflora:* High-arctic–Amphi-Atlantic. From north coast of Alaska across the arctic islands to northern W. and E. Greenland, south to the arctic coast of Mackenzie and Keewatin districts and northernmost Baffin Island. Also in Spitsbergen, Franz Joseph Land, and Novaya Zemlya.

Saxifraga cernua L.—Simmons, 1913, p. 102.

Banks Island: Cape Lambton, No. 17578; Sachs Harbour; Storkerson Bay, Manning and Macpherson, No. 129; Cape Croizer, *idem*, No. 162; Mercy Bay, Manning and Sparrow, Nos. 211, 212; Russell Point, No. 17704. Victoria Island: Noted at Wollaston Peninsula, Holman Post, Minto Inlet, head of Prince Albert Sound, and interior north of Cambridge Bay; Cambridge Bay, Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, No. 139. Melville Island: McMillan, No. 77311; Jenness, No. 27. Isachsen Island: Heywood, Nos. 13 and 14. King William Island: Larsen, No. 24; Fortier, No. 91. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Diana Lake, Nos. 18695-6.

Occasional to common in wet tundra, in wet moss by lake shores, and by small streams.

Geographical Area: Circumpolar, arctic-alpine.

Arctic Am. Range: From Bering Strait to E. and W. Greenland, north beyond lat. 83° N., south to Great Bear Lake, northern Hudson Bay and Labrador. Isolated in Gaspe, Newfoundland, and on Lake Superior. In Rocky Mountains south at least to high mountains of Colorado.

Saxifraga flagellaris Willd. ssp. **platysepala** (Trautv.) Porsild in Bot. Tidsskr. 50, 4 : 16 (1954).

S. flagellaris var. β Hook. Fl. Bor.–Am. 1 : 253 (1834) tab. 87, figs. B. and 4.

S. flagellaris var. β *platysepala* Trautv. Fl. taimyr. p. 43 (1847).

S. flagellaris ssp. *cuflagellaris* var. *platysepala* Engl. & Irmsch. Pflanzenr. IV, 117, 1 (160) 1916, quoad pl. Am. arcticae.

S. flagellaris, Simmons, 1913, p. 100.

(Map, fig. 20)

Banks Island: Summit of high plateau between Nelson Head and Masik Pass, 2,400 feet elev., No. 17775; Mercy Bay, Manning and Sparrow, No. 215; *ibid.*, Miertsch. (Kew!); Castel Bay, Jenness, No. 53; Russell Point, No. 17705. Victoria Island: Head of Minto Inlet, No. 17504; northeast coast, Jenness, No. 34. Prince Patrick Island: Mould Bay, MacDonald, Nos. 26, 140, and 141. Melville Island: Liddon Gulf, Jenness, No. 26; *ibid.*, Parry Exp. Bathurst Island: Jenness, No. 7. Isachsen Island: Heywood, No. 15. Axel Heiberg Island: On 2,200-foot plateau west of Mokka Fd., No. 18734.

Hooker (l.c.) realized that two varieties or races of *S. flagellaris* were present in North America but did not know that they occupied distinct geographic areas. The two races are readily separated on the following characters:

Hypanthium turbinate, dark purple; sepals ovate-oblong, united in their lower third and, like the hypanthium, covered by long-stipitate, purplish-headed glands. Base of ovary attached. Petals pale yellow.

ssp. *platysepala*
amphi-Atlantic; high-arctic

Hypanthium broadly campanulate, green, and like the linear-oblong, free sepals lacking purplish-headed glands. Ovary free or almost so. Petals deep yellow.

ssp. *flagellaris*
amphi-Beringian

As shown by the writer (Porsild, 1954) ssp. *platysepala* is a high-arctic amphi-Atlantic race, which from western Siberia over Novaya Zemlya, Spitsbergen, and northern Greenland extends across the Canadian Arctic Archipelago but does not reach Alaska. In common with some other arctic plants, it has a disjunct area far south in the Cordillera, on high peaks of Colorado, Utah, and Arizona (*S. Crandallii* Gand.) and a similarly disjunct area in the highlands of Pamir, Tien Shan, and Altai in central Asia (*S. Komarovi* A. Los. and *S. setigera*, sensu A. Los. in Fl. U.S.S.R., in part, not Pursh). The main area occupied by ssp. *flagellaris* is northwestern North America and northeastern Asia where ssp. *platysepala* does not occur. Disjunct areas of ssp. *flagellaris* are found in Kashmir, west Tibet, and Caucasus. Only in Caucasus, Pamir, and in the Taimyr Peninsula of western Siberia have the two races been reported to occur in the same region.

In North America both races of *S. flagellaris* appear to be obligate calcicoles and thus far have not been collected outside the areas of calcareous Palaeozoic rocks. Both have a pronounced preference for well-drained gravelly soils that during the growing season are well supplied with water from melting snowbanks. Although ssp. *platysepala* perhaps depends mainly on vegetative reproduction and dispersal, for which it is particularly well suited by its long flagellate runners terminating in small rooting rosettes, it reproduces also, though perhaps less regularly, by seed even in the highest latitudes (Cape Sheridan, Ellesmere Island, lat. 82° 30′ N., J. Kelsall, No. 52). In Banks Island, in 1949, it was one of the few phanerogams that at the end of an exceptionally unfavourable summer succeeded in producing seeds (Porsild, No. 17775). In the Canadian Arctic, even though occasionally reported from sea-level, ssp. *platysepala* is most often found at higher elevations (Nelson Head, at 2,400 ft., Porsild, No. 17775, and on Axel Heiberg Island, *idem*, No. 18734 at 2,200 ft.) and nearly always in gravelly places near snowbeds. In such places it may be common locally, although generally it is by no means ubiquitous. It seems unable to compete with other and more aggressive phanerogams but occasionally may be seen growing among mosses or lichens. The daughter plants occasionally flower while still attached to the mother plant. Although a single flower perhaps is the rule, 2- or even 3-flowered specimens are by no means rare and have been collected in Prince Patrick Island and in northernmost Ellesmere Island.

Distribution of ssp. *platysepala*: From Banks Island across northern islands of the Arctic Archipelago to northern Greenland, apparently lacking in Baffin Island and the Hudson Bay region. Disjunct in Colorado, Utah, and Arizona (*S. Crandallii* Gand.). Also in Spitsbergen, Novaya Zemlya, and arctic Siberia east to Taimyr Peninsula. Disjunct (*S. Komarovi* A. Los.) in central Asia (Pamir, Tien Shan, and Altai).

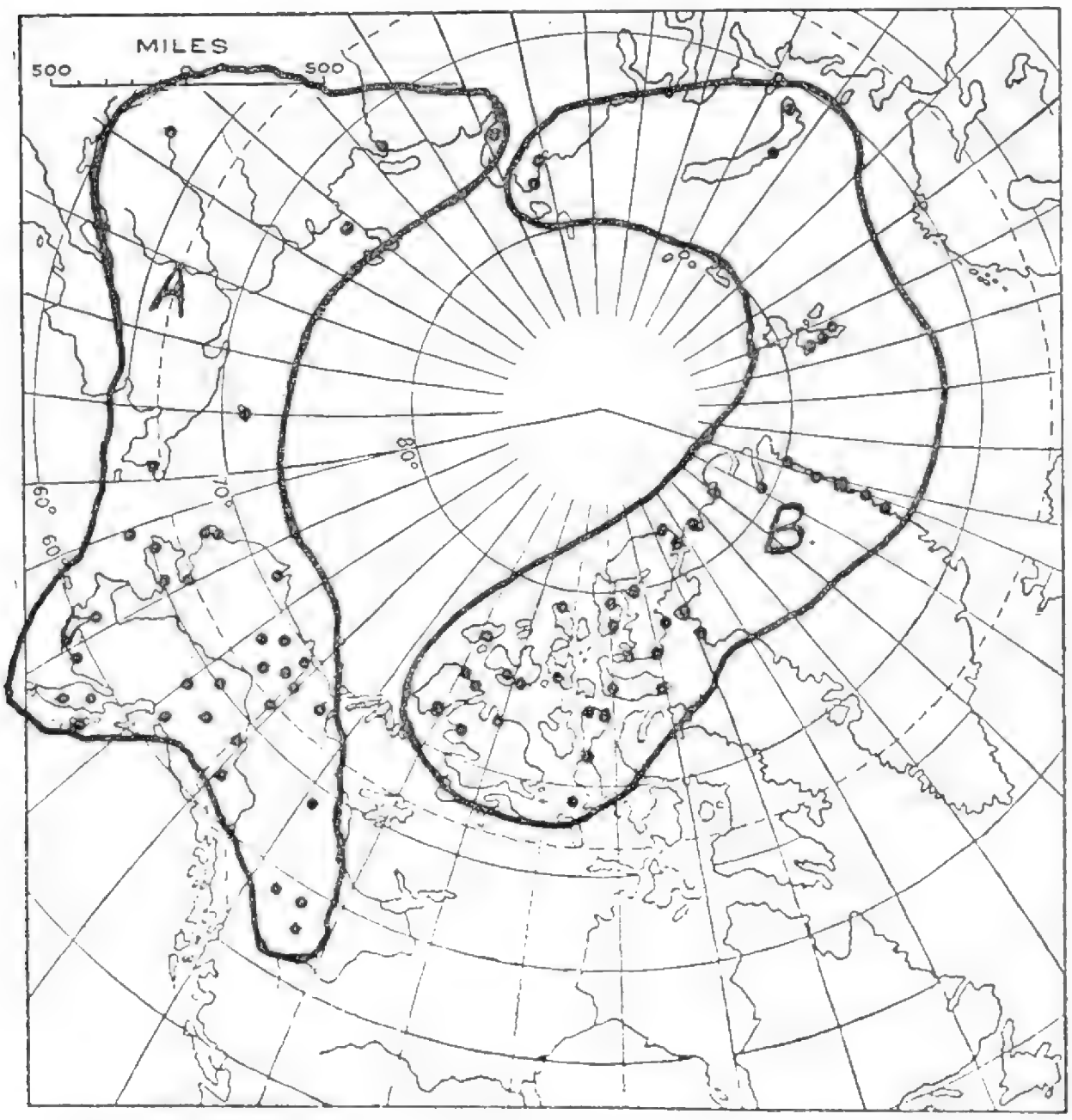

Figure 20. Main areas of *Saxifraga flagellaris* ssp. *flagellaris* (A), and ssp. *platysepala* (B).

Saxifraga foliolosa R. Br.

S. stellaris, Simmons, 1913, p. 102.

Banks Island: Russell Point, dwarf specimens on mossy hummock in a swamp where it was very scarce, No. 17706. Victoria Island: Holman Post, tall, luxuriant specimens on heavily manured beach, No. 17307. Prince Patrick Island: Mould Bay, MacDonald, No. 142. Melville Island: Liddon Gulf, Jenness, No. 29. King William Island (acc. to Simmons, l.c.).

Occasional to rare in moist, mossy places. The species responds strongly to manure, and at Holman Post abundance of rooted bulbils were noted on the ground near the parent plants. *S. foliolosa* reproduces vegetatively, not only by bulbils on the floral axes, but also by filiform runners terminating in buds that root and give rise to new individuals (Compare Warming, 1909, p. 218 and fig. 31B).

Geographical Area: Circumpolar arctic; in North America from Bering Sea across arctic Alaska and Yukon to northern and central E. and W. Greenland, north beyond lat. 83° N., south to northern Hudson Bay region and northern Labrador.

Saxifraga hieracifolia Waldst. & Kit.—Simmons, 1913, p. 101.

Victoria Island: Cambridge Bay, Anderson (Kew!). Melville Island: Parry's 1st Voy. (in herb. W. C. Trevelyan, Kew!)[1]. King William Island: 5th Thule Exp., No. 1209. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Apparently rare, and although looked for in suitable places the writer failed to discover additional stations.

Geographical Area: Circumpolar arctic with large gaps in North America where it is continuous from Bering Sea through Alaska and Yukon to the Mackenzie Mountains north to Mackenzie Delta. An isolated population in eastern Canadian Arctic from Devon Island, northern Baffin Island and Foxe Basin, south to central Keewatin, north to Boothia Peninsula, King William Island, and southern Victoria Island. Central E. Greenland, but lacking on the north and west coasts.

Saxifraga Hirculus L. var. **propinqua** (R. Br.) Simm. Fl. Ellesmerel. 65 (1906); *idem*, 1913, p. 100.

Banks Island: De Salis Bay, Manning and Macpherson, No. 10; noted at Cape Lambton; Storkerson Bay, Manning and Macpherson, No. 130; Cape Crozier, Manning and Sparrow, No. 163; Mercy Bay, *idem*, Nos. 213-4; Castel Bay, Jenness, No. 52; Russell Point, No. 17707. Victoria Island: Read Island; Holman Post; head of Prince Albert Sound, No. 17445; Minto Inlet, Anderson (Kew!); head of Minto Inlet; Tahoe Lake; south coast, Rae (Kew!); Cambridge Bay, Anderson (Kew!); *ibid.*, Fortier, No. 12; Richard Collinson Inlet, Jenness, No. 21. Prince Patrick Island: Mould Bay, MacDonald, Nos. 143-4. King William Island: Larsen, No. 26; 5th Thule Exp., No. 1203. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville Island: Winter Harbour, McMillan, CAN, No. 77304. Axel Heiberg Island (acc. to Simmons, l.c.).

Common or even ubiquitous in moist places in tundra, by lake shores or along brooks. At Russell Point some specimens flowered on August 20, but last year's fully developed capsules show that the species even there matured seeds in favourable seasons.

Geographical Area: Circumpolar (?), arctic-alpine. In North America, from northern Bering Strait east along the Arctic Coast to the Hudson Bay region and Baffin Island, north across the Arctic Archipelago to lat.

[1]Undoubtedly the basis for R. Brown's (l.c., 1824) *S. nivalis α corymbus multiflorus thyrsoideus, pedunculis inferioribus trifloris.*

83° N. in Ellesmere Island, south to Great Bear Lake, Keewatin, and James Bay. Also north Greenland, Spitsbergen, Novaya Zemlya, and arctic Siberia. Apparently lacking in central and southeastern Yukon, British Columbia, and the Canadian Cordillera but with a small, disjunct area in Colorado. In the Bering Sea region the var. *alpina* Engl. differs but slightly from var. *propinqua*. Typical *S. Hirculus* is found in central and southern Alaska and through the Brooks Range to the Mackenzie Delta.

Saxifraga nivalis L.—Simmons, 1913, p. 101.

Banks Island: Cape Lambton, No. 17579; Storkerson Bay, Manning and Macpherson, No. 132; Bernard Island, No. 17756; north coast, M'Clure (Kew!); Cape Crozier, Manning and Macpherson, No. 164; Mercy Bay, Manning and Sparrow, Nos. 216-7; Castel Bay, *idem*, No. 180. Victoria Island: Holman Post, No. 17309; Washburn Lake; Cambridge Bay, Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, Nos. 27, 29, 145-6. Melville Island: Winter Harbour, McMillan, CAN, No. 77305. King William Island: Larsen, No. 25. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Isachsen Island: Heywood, No. 16. Axel Heiberg Island: Head of Mokka Fd., No. 18699, and interior plateau, 2,200 feet, No. 18735.

Geographical Area: Circumpolar, arctic-alpine. In North America common from E. and W. Greenland west to Great Bear Lake, north across the Arctic Archipelago to beyond lat. 83° N., south to northern Ungava and northern Hudson Bay region. Disjunct populations in mountains of southeast Yukon and northern British Columbia and Bering Sea and Pacific Coast regions of Alaska.

Saxifraga oppositifolia L.—Simmons, 1913, p. 98; Macoun & Holm, 1921, p. 15.

Banks Island: De Salis Bay, Manning and Macpherson, No. 72; Cape Lambton; Sachs Harbour, Manning and Sparrow, No. 241; Storkerson Bay, Manning and Macpherson, No. 131; north coast, Miertsch. (Kew!); Cape Crozier, Manning and Macpherson, No. 165; Russell Point, No. 17710. Victoria Island: Read Island, No. 17202; Wollaston Peninsula: *ibid.*, C.A.E., No. 390; Holman Post; Prince Albert Sound; Minto Inlet, Anderson (Kew!); head of Minto Inlet; Cambridge Bay, Anderson (Kew!); *ibid.*, Fortier, No. 16; Greely Haven, *ibid.*, No. 96. Prince Patrick Island: Mould Bay, MacDonald, Nos. 28, 147-8, the last with flowers 2·5 cm. in diameter. Melville Island: Winter Harbour, McMillan, CAN, No. 77275. Bathurst Island: Jenness, No. 1; Aime, No. 5. Prince of Wales Island: Fortier, Nos. 31 and 74. King William Island: Larsen, No. 21; 5th Thule Exp., No. 1247. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Head of Mokka Fd., Nos. 18697-8. Ellef Ringnes Island (acc. to Simmons, l.c.).

Common and even ubiquitous and growing in a variety of habitats, seemingly avoiding only the wettest. The very striking snowy white var. *albiflora* Lge. has been collected on Salisbury Island, Hudson Strait, Manning, No. 10; Cornwallis Island, Collins, No. 135A; and at Clifton Point, Dolphin and Union Strait, C.A.E., No. 674.

Geographical Area: Circumpolar, arctic-alpine. In North America from Bering Strait to E. and W. Greenland, north beyond lat. 83° N., south through the Cordillera to Wyoming, the Hudson Bay region, Ungava and Newfoundland, and in mountains of northern Vermont.

Saxifraga rivularis L., *s. lat.*—Simmons, 1913, p. 103.

Banks Island: Cape Lambton, No. 17580; Storkerson Bay, Manning and Macpherson, No. 133. Victoria Island: Head of Prince Albert Sound; Holman Post, No. 17310; head of Minto Inlet, Nos. 17403 and 17505. Prince Patrick Island: Mould Bay, MacDonald, No. 149. Isachsen Island: Heywood, No. 17. Prince of Wales Island: Fortier, No. 73. Also King William and Melville islands: Parry's 1st Voy. (Kew!).

Occasional in wet moss by brooks and on sheltered lake shores. On refuse heaps near the village at Holman Post, 4-inch-tall specimens grew among tall grasses.

Geographical Area: Circumpolar, arctic-alpine. In North America from Bering Strait to E. and W. Greenland north in the Arctic Archipelago beyond lat. 79° N., south to Hudson Bay region and the Gulf of St. Lawrence and mountains of New Hampshire, south through the Cordillera to Wyoming.

Saxifraga tenuis (Wahlenb.) Sm.

Banks Island: Russell Point, Nos. 17709 and 17711. Prince Patrick Island: MacDonald, Nos. 29, 150-4. Bathurst Island: Jenness, No. 3. Isachsen Island: Heywood, No. 18.

In rather damp places on solifluction slopes and on snowbeds, and probably always in calcareous soil.

Geographical Area: Amphi-Atlantic, arctic. Arctic Europe and eastern North America: E. and W. Greenland, north to lat. 83° N. in the Arctic Archipelago, south to northern Hudson Bay region and northern Labrador-Ungava; with disjunct populations in central Yukon and in Gaspe (*S. gaspensis* Fern.).

Saxifraga tricuspidata Rottb.—Simmons, 1913, p. 99; Macoun & Holm, 1921, p.15.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 30, 78, 95, and 101; Cape Lambton, Nos. 17581-2; north shore, Miertsch. (Kew!); Mercy Bay; Russell Point, No. 17712. Victoria Island: Read Island; Holman Post; Minto Inlet; Anderson (Kew!); head of Minto Inlet; Washburn Lake; Richard Collinson Inlet, Jenness, No. 15; Cambridge Bay, Fortier, No. 19. Melville Island: Parry's 1st Voy. ex Herb. Trevelyan

(Kew!). Axel Heiberg Island: Head of Mokka Fd., No. 18700. King William Island: Larsen, No. 23. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common or even ubiquitous in rocky or gravelly places, in screes or in dry tundra.

Geographical Area: From Bering Strait across arctic and subarctic Canada to W. Greenland (except southernmost part), isolated in central E. Greenland; in Ellesmere Island, northward beyond lat. 83° N., southward in the Canadian Cordillera to lat. 54° N.; east shore of Lake Winnipeg, north shore of Lake Superior, Hudson Bay, east shore of James Bay and the coast of Labrador.

Chrysosplenium tetrandrum (Lund) Fries.

C. alternifolium, Simmons, 1913, p. 97.

C. iowense, Rosendahl in Rhod. 49 : 25-35 (1947) , at least as regards the plant of Canadian Arctic; Cody, 1953.

Banks Island: Storkerson Bay, Manning and Macpherson, No. 128; Castel Bay, Manning and Sparrow, No. 178; Russell Point, in a wet marsh by a lake, No. 17702 (stamens 7 to 8). Victoria Island: Head of Minto Inlet, No. 17503; Cambridge Bay, Anderson (Kew!); *ibid.*, No. 17470 (stamens 4); *ibid.*, Margaret E. Oldenberg as *C. iowense* (acc. to Rosendahl); *ibid.*, A. H. Gibson, Sept. 2, 1949 (Herb. G. H. Turner). King William Island: 5th Thule Exp., Nos. 1174 b and 1224 (as *C. alternifolium*). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville Island (acc. to Simmons, l.c.). Cornwallis Island: H. B. Collins, No. 185.

Rosendahl, l.c., concluded that *C. iowense* Rydb. is a good and distinct species, well separated from both *C. tetrandrum* and *C. alternifolium*, and that most North American collections heretofore referred to *C. tetrandrum* should rightly be called *C. iowense*. Fernald, in the 8th edition of Gray's Manual, under *C. "ioense"*, apparently has accepted this view.

It is not clear from his treatment how much material of arctic North American *Chrysosplenium* Rosendahl has seen, because only the twenty-four collections of *C. iowense* examined by him are cited in his paper; and of those twenty-four collections all but two from the Canadian Arctic are from Iowa and central Alberta. Although Rosendahl has identified what he considers typical *C. iowense* in the Canadian Arctic (Victoria Island, Cambridge Bay, Margaret E. Oldenburg, No. 291; and Cairn Lake, Baffin Island, Ralph Robinson, No. 42), the discussion clearly shows that he still admits the presence in the Canadian Arctic of typical *C. tetrandrum*. In the discussion of its relationship, Rosendahl admits that *C. iowense* may be "closer phylogenetically to *C. alternifolium* than to *C. tetrandrum*" but maintains that it is amply distinct from the common Old World species. He does not, however, compare it with *C. Wrightii* (*C. Beringianum*), which may be considered a North American race of *C. alternifolium*, and he disagrees with Simmons (1906) and others who have considered *C. tetrandrum* a reduced and depauperate arctic variety of *C. alternifolium*. Among them, but not cited by Rosendahl, is Warming (1909), who found self-pollination inevitable in *C. tetrandrum* and thought it possibly

accounted for the reduction, by abortion, of superfluous stamens. Rosendahl, l.c., discounts Simmons' observation that in the Arctic "intermediate forms are found connecting the var. *tetrandrum* to *C. alternifolium*", maintaining that these alleged "intermediate forms" are all *C. iowense*.

In distinguishing *C. iowense* from *C. tetrandrum*, Rosendahl stresses the importance of such characters as the shape of flower, the number and length of stamens, and the shape and pubescence of stolon leaves. Thus in *C. iowense*, the flowers in anthesis are said to be bright yellow, short-campanulate, the stamens 5 to 8 in number, 0·6 to 0·7 mm. long, and the stolon leaves pubescent on both surfaces and orbicular-reniform; whereas in *C. tetrandrum* the flowers are said to be green, sometimes faintly tinged with yellow, turbinate, the stamens 4 in number, 0·3 to 0·4 mm. long, and the stolon leaves reniform, the blade glabrous.

Unfortunately few of these characters are constant, and in any large series of specimens they can at most be said to apply to somewhat better than half. Thus, in some specimens of *C. iowense* cited by Rosendahl, the large and central flowers of the inflorescence may have 7 to 8 stamens, and the smaller and lateral ones nearly all 4. Likewise, most stolon leaves may be orbicular in outline with narrowed, closed sinuses, but many are distinctly reniform, and but few have pubescent blades.

Because even in the Arctic, *Chrysosplenium* flowers very early, flowering specimens rarely find their way into herbaria. Furthermore, the hypanthium of *C. tetrandrum*, which during anthesis may have been turbinate because of the swelling of the maturing ovaries, may later more correctly be described as companulate (Compare e.g. Warming, l.c., fig. 39). At any rate, among the 60-odd sheets of *Chrysosplenium* from arctic North America now before me, turbinate as well as campanulate flowers may be found in practically every collection. In a few collections some central and larger flowers contain 5 to 7 or even 8 stamens, whereas others contain only 4; but in most of the flowers examined, 4 stamens appear to be the rule.

In a second series of some 40-odd sheets of *C. tetrandrum*, mostly from alpine but non-arctic parts of Alaska, Yukon, British Columbia, and Alberta, the percentage of flowers containing more than 4 stamens is even smaller (Compare also Hultén, Fl. Alas. & Yukon, p. 950), and only a dozen or so collections from central Alberta (George H. Turner, Nos. 471, 1670, 5477, 5616, 5627, 5628, 5629, 6101, 6122, 6262, 7098, all from the Edmonton district) as well as collections from Wallwort, Saskatchewan, Breitung, No. 562, and from Duck Mt. and Riding Mt. National Park, Manitoba, Scoggan and Baldwin, Nos. 7693 and 7370, differ consistently from the northern or alpine plant. Reporting on the ecology of *C. iowense* in the Edmonton district, Dr. Turner states (in litt.) that "its habitat is much like that of *Adoxa* with which it was actually associated in the Elk Island Collection". This suggests that *C. iowense* is not arctic. On phytogeographical grounds alone, it would appear safest to consider *C. iowense* an isolated relic race of *C. tetrandrum* intermediate between the typical arctic plant on one hand, and the 8-stamened *C. Wrightii* of eastern Asia, Alaska, and southwest Yukon, on the other.

Chrysosplenium tetrandrum is a pronounced nitrophile, which in the Arctic frequently grows in wet, springy places in soil rich in organic matter or enriched by animal manure. Thus it commonly thrives among the ruins of former Eskimo dwellings or inside collapsed Eskimo burials or meat caches.

Geographical Area: Circumpolar, arctic-alpine. In North America from Bering Strait to Baffin Island, north across the Archipelago to southern Ellesmere Island, south to northern Ungava-Labrador and the Hudson Bay region, Great Bear and Great Slave lakes to north Alberta and to mountains of Alberta and British Columbia. Curiously enough *Chrysosplenium* is lacking in W. Greenland but known from a few isolated stations in E. Greenland, in lat. 74° 25′ N.

ROSACEAE

Rubus Chamaemorus L.—Simmons, 1913, p. 109.

According to Simmons (l.c.), Klutschak, in 1881, recorded *Rubus Chamaemorus* from King William Island. Although Simmons, l.c., is inclined to accept the record, the fact remains that no later visitors to King William Island have reported it there, nor has it been collected in Banks or Victoria islands, or indeed elsewhere in the Archipelago except the southern part of Baffin Island. It is, of course, entirely possible that seeds of *Rubus Chamaemorus* could have been brought to King William Island by birds or foxes and that the seeds germinated and persisted there for some years. Such is the case in W. Greenland, where, in several of its stations, only the staminate or the pistillate plants occur but where, nevertheless, it has persisted by vegetative reproduction for a long time.

Distribution: Circumpolar. In North America from Bering Strait to southernmost Baffin Island and southern W. Greenland, north to the shores of the Arctic Ocean, and south to Maine and mountains of New Hampshire, the north shore of Lake Superior, northern and central Manitoba and Saskatchewan, and in peatbogs of Alberta or British Columbia, south to lat. 50° N. In Spitsbergen north to Isfjord, Asplund, Aug. 13, 1915 (O!).

Potentilla Egedii Wormskj. var. **groenlandica** (Tratt.) Polunin.

P. pacifica Howell.

Victoria Island: On clay flats below high-tide level near Holman Post; well-developed flowering specimens on August 8, No. 17312.

A distinctly southern species, in the Archipelago otherwise known only from the southernmost parts of Baffin Island.

Distribution: Probably circumpolar; entirely littoral. In arctic North America, here and there along the Arctic Coast, from the shores of Bering Sea east to southern E. and W. Greenland, with a large gap between Bathurst Inlet and Hudson Bay; south to Labrador, Hudson Bay, and the Pacific Coast.

Potentilla hyparctica Malte, Rhod. 26:177 (1934).

P. emarginata Pursh, not Desf. *See* Fernald in Rhod. 45 : 111 (1943); Simmons, 1913, p. 108.

Banks Island: Cape Crozier, Manning and Macpherson, No. 166; Mercy Bay, apparently very rare, on slide rock below a gyrfalcon's nest, No. 17757; *ibid.*, Miertsch. (Kew!); Baring Lane, M'Clure (acc. to Simmons); Russell Point, on wet scree, No. 17713. Prince Patrick Island: Mould Bay, MacDonald, Nos. 30, 158-9. Melville Island: Winter Harbour, McMillan, CAN, No. 77290. Ellef Ringnes Island (acc. to Simmons). Axel Heiberg Island: Central plateau west of Mokka Fd., elevation 2,200 feet, No. 18736.

In his careful analytical study, M. P. Porsild (1946) has reiterated the findings of Wolf (1908), Abromeit (1899), Polunin (1940), and others, concluding that the dwarfed alpine and high-arctic plant that Malte, l.c., separated as *P. hyparctica* is of slight geographic significance and can scarcely be considered more than a variation of the taller less caespitose *P. emarginata* Pursh var. *elatior* Abrom. Unfortunately, as first pointed out by Simmons (1906) and demonstrated by Fernald, l.c., *P. emarginata* Pursh is a later homonym and as such must be replaced by the first available specific name, which appears to be *P. hyparctica* Malte. The type of *P. emarginata* Pursh came from Labrador and is the taller, less arctic plant *P. emarginata* v. *elatior* Abrom., which then becomes *P. hyparctica* var. *elatior* (Abrom.) Fern.

Potentilla hyparctica is a pronounced oxylophyte and was noted only in the northernmost parts of Banks Island and not seen at all on Victoria Island. Our specimens are intermediate between var. *elatior* and the typical plant. The latter appears to be the only one found in the northern islands of the Archipelago. In the eastern Canadian Arctic, *P. hyparctica* and its var. *elatior* occur together, as is the case in Greenland.

Geographical Distribution: Circumpolar, arctic. In North America: *P. hyparctica*: Northernmost islands of the Arctic Archipelago north beyond lat. 83°, northern E. and W. Greenland. *P. hyparctica* var. *elatior*: From the shore and islands of Bering Sea east to northern E. and W. Greenland, south to northernmost Labrador, and Keewatin, with isolated stations in the Shickshock Mts. of Gaspe. In the west on high mountains of Alaska and Yukon south through the Rocky Mts. at least to about lat. 51° 30′ N.

Potentilla nivea L. ssp. **Chamissonis** (Hult.) Hiitonen in Arch. Soc. Zool. Bot. Fenn. Vanamo 2:25 (1947).

P. Chamissonis Hult. Bot. Not. 1945, p. 140, fig. 1, d.

P. nivea, Simmons, 1913, p. 107, in part.

(Plate XX)

Banks Island: De Salis Bay, Manning and Macpherson, No. 22; Nelson Head, cliffs on foreland near contact between trap and sedimentary rocks, No. 17783; Cape Lambton on trap-rock cliffs and steep talus slopes. No. 17584; *ibid.*, Manning and Macpherson, No. 86. Victoria Island: Holman Post on heavily manured beach near village, No. 17313; head of Minto Inlet on strandflat near mouth of river, No. 17405. Cambridge Bay, Anderson (Kew!).

In addition, the following specimens of *P. nivea* ssp. *Chamissonis* are in the National Herbarium of Canada:

Mackenzie District: Arctic Coast, Atkinson Point, 70° N.–131° 20′ W., No. 2635 (an almost glabrous form). Coppermine River, dry ledges, vicinity of post, *idem*, No. 17181; Great Bear Lake, Scented Grass Hills Peninsula, on strandflats on south shore, *idem*, No. 17051; near Hardisty Lake, 64° 30′-65° N.–115°-117° W., C. S. Lord, No. 16.

Keewatin District: Yathkyed Lake on Kazan River, Porsild, No. 5828; Kazan River below Yathkyed Lake, *idem*, No. 6047; Mistake Bay, 62° 5′ N.–93° 6′ W., *idem*, No. 5695; Chesterfield Inlet, 63° 19′ N.–90° 37′ W., rocky ledges and crevices of rock, *idem*, No. 6170; *ibid.*, July 1926, L. T. Burwash, *ibid.*, M. O. Malte, CAN, Nos. 120430, 120472, 120518, 120542.

Ungava Peninsula: Wakeham Bay, Hudson Strait, 61° 40′ N.–72° 5′ W., M. O. Malte, CAN, Nos. 119081, 119105, 120249; east coast of Hudson Bay, mouth of Great Whale River, Spreadborough, CAN, No. 14279.

West Greenland: Etah, 78° 20′ N.–72° 30′ W., Rupert Bartlett, No. 167; *ibid.*, J. Dewey Soper, CAN, No. 111581; Olrik Bay, 77° 21′ N.–68° 12′ W., Rupert Bartlett, Nos. 92-3; Agpatsiait, 71° 5′ N., July 27, 1935, M. P. Porsild; Uvkusigssat, 71° 3′ N., July 28, 1935, *idem* (both distributed as *P. maculata*); Kingigtoq, 70° 10′ N., elevation 400 m., C. O. Erlanson, No. 3298; south coast of Disko Island, near Godhavn, 69° 14′ N., July 27-28, 1937, Porsild, No. 289; *ibid.*, August 8-10, 1927, *idem*, No. 352; head of Søndre Strømfjord, David C. Nutt, No. 312; Ikertoq Fjord, 66° 58′, July 31, 1914, M. P. and A. E. Porsild.

East Greenland: Loch Fine, 74° N., July 28, 1939, Rupert Bartlett, No. 370; Payer Land, Grant Fjord, August 12, 1939, *idem*, No. 422.

Potentilla nivea ssp. *Chamissonis* is a somewhat variable plant as regards pubescence and stature but in its typical form is easily distinguished from all other races of *P. nivea*. The flowering stems and leaf petioles may become almost totally glabrous in age when even the underside of the leaves may become glabrate.

Malte, in his posthumously published notes (1934, p. 172), recognized in the plant he knew from the Hudson Bay area an entity distinct from typical *P. nivea*; this plant he referred to var. *pallidior* Sw. but failed to recognize the significance of the characteristic pilosity of the petioles or of the long-stalked terminal leaflets, which he pronounced of no taxonomic importance.

There is no indication, however, that Malte held an independent view of the taxonomic status of var. *pallidior*, and it seems most likely that he merely followed Wolf (1908, pp. 236-7), who stated that the variety is found in Greenland and in arctic Europe. Wolf also stated that it had been reported from Altai, but that the plant from Greenland and arctic Europe, at any rate, judging from Wahlenberg's brief diagnosis and commentary (Fl. Suec. 326), could scarcely be considered more than a glabrous variation of the var. *vulgaris*. Hultén, l.c., under the synonymy of *P. Chamissonis* does not include var. *pallidior* Sw., although at any rate the Greenland plant referred to by Wolf most likely was *P. Chamissonis* Hult.

The writer, who already, in 1930, had collected ssp. *Chamissonis* at Chesterfield Inlet and in various other parts of Keewatin, considered it amply distinct. An unpublished description of the Hudson Bay plant that differs in several respects from Hultén's description reads as follows:

"*Potentilla* n. sp.: Loosely caespitose with sterile rosettes from an ascending base; flowering stems 25 to 40 cm. high, stout, conspicuously flexuous, purplish green, sparingly villous, glabrous in age, simple or freely branched from near the base and bearing a few much reduced leaves. Basal leaves well developed, their petioles slender, twice as long as the blade, glabrous or with sparse, long and spreading hairs; the blade ternate, rarely quinate, the leaflets oblong, 2 to 3 cm. long with from 5 to 9 large, blunt teeth, the terminal leaflet prominently stalked; leaflets sparingly glandular-pruinose on both sides, fresh to dark green and glabrous above, pale green and thinly tomentulose or glabrate beneath under a sparse indument of long, villous hairs, which persist on the prominent nerves; the margins not revolute. Stipules large, brown. Flowers 3 to 7, borne on 5 to 15 cm. long peduncles; calyx 20 to 23 mm. in diameter, villous and somewhat glandular-pruinose; bracts narrow and equalling the 8 to 10 mm. long and very narrowly triangular sepals; petals pale yellow, broadly obovate, 6 mm. long, 7 mm. wide, shallowly emarginate; style equalling the large, smooth achene, not enlarged or glandular at the base."

Malte, l.c., ascribed the luxuriant ("peculiar") habit of his Chesterfield Inlet plant to the proximity of dog kennels. This can hardly be the case, for some specimens collected by the writer, far from human habitation, at Chesterfield and elsewhere, are even taller than Malte's.

An arctic amphi-Atlantic race thus far known from Banks and Victoria islands, Great Bear Lake region, Keewatin, northern Ungava, northern and central west Greenland, central east Greenland and, according to Hultén, l.c., from Spitsbergen and northern Scandinavia and Kola Peninsula. The type is from Swedish Lapland.

Potentilla nivea L. ssp. **Hookeriana** (Lehm.) Hiitonen in Arch. Soc. Zool. Bot. Fenn. Vanamo 2 : 25 (1947).

P. nivea, Simmons, 1913, p. 107, in part.

P. Hookeriana, Hult. Bot. Not. 1945, p. 139.

Victoria Island: Read Island; Minto Inlet, Anderson (Kew!) and (S) fide Hultén, l.c.; Walker Bay, No. 17496; Washburn Lake, No. 17459.

Occasional to common on dry, sunny cliffs.

Distribution: A well-marked western race, which from Alaska extends eastward through Yukon and Mackenzie to Coppermine River and Victoria Island, thence south through the Mackenzie Basin and the Canadian Rockies at least to Banff National Park. It is a pronounced calciphile, and its American range pretty well coincides with that of the Palaeozoic series of northwest America. According to Hultén, l.c., it is widely distributed through northern Asia.

Potentilla pulchella R. Br.—Simmons, 1913, p. 100.

Banks Island: De Salis Bay, No. 17634; *ibid.*, Manning and Macpherson, No. 43; Cape Lambton, No. 17585; Sachs Harbour, No. 17522; Bernard Island, No. 17823; Mercy Bay, Miertsch. (Kew!); Russell Point, Nos. 17716 and 17721. Melville Island: Type locality. Axel Heiberg Island: Head of Diana Lake, Nos. 18703–5; several stations (acc. to Simmons).

Although not a littoral species, *P. pulchella* is rarely found far from the sea-coast. In Banks and Victoria islands it was commonly found on strandflats and frequently on owl perches. The specimens listed above vary considerably in size according to the habitat but are otherwise typical of the species.

An arctic amphi-Atlantic species whose centre of distribution is probably in eastern American Arctic. Alaska (few stations on north coast); common along the Arctic Coast and across the Arctic Archipelago to northern W. and E. Greenland, north beyond lat. 83°, south to shore and islands of Hudson Bay. Also in Spitsbergen and Novaya Zemlya with a single station in arctic Finland. In Newfoundland the closely related and rarely collected *P. usticapensis* Fern.

Potentilla pulchella R. Br. var. **gracilicaulis** Porsild, *in* Sargentia 4 : 48 (1943).

?*P. pulchella* var. *elatior* Lge., Consp. Fl. Groenl. 1880, p. 4.

Banks Island: De Salis Bay, Manning and Macpherson, No. 35. Victoria Island: Holman Post, on a strandflat above the high-tide mark, No. 17314; head of Minto Inlet on strandflat near mouth of river, No. 17406.

The var. *gracilicaulis* differs strikingly from typical *P. pulchella* by its slender, erect-ascending flowering stems and by its fresh green leaves, which are thinly sericeous pubescent above and sparingly villous beneath. The type came from Atkinson Point east of the Mackenzie Delta (Porsild, No. 3632), and it is known thus far only from a dozen collections from the Arctic Coast between Herschel Island and Cape Bathurst.

The writer has seen no authentic Greenland material of var. *elatior* Lge., but specimens from the Hudson Bay region in the National Herbarium of Canada, which by Rydberg in 1907 were thus annotated but later, because of an earlier homonym, changed to *P. subarctica* (Rydberg, 1908, p. 347), are coarser and perhaps merely luxuriant forms of *P. pulchella* R. Br.

Potentilla rubricaulis Lehm. Nov. stirp. Pugill. 2 : 11 (1830) and Revisio Pot. 68, tab. 30 (1856).—Simmons, 1913, p. 106; Polunin, 1940, p. 279. *See also* Porsild, Sargentia 4 : 49 (1943) and Bull. Nat. Mus. Canada 121 : 229-230 (1951).

P. subquinata Pedersenii Rydb. in Bull. Torr. Bot. Cl. 28 : 182 (1901).

P. rubricaulis var. *arctica* Simm. in Fl. Ellesmerel. 1906, p. 50, tab. 5.

P. Pedersenii Rydb. in N. Am. Fl. 22,4 : 332 (1908); Ostenf., 1923, pp. 182-187; Malte, 1934, p. 172, pro max. pte.

P. Vahliana, Macoun & Holm, 1921, p. 16, pro max. pte., not Lehm.

(Map, fig. 21)

Banks Island: De Salis Bay, No. 17635; *ibid.*, Manning and Macpherson, No. 42; Nelson Head, *idem*, No. 85; Cape Lambton, on grassy scree below sea-gull cliffs, No. 17586; Sachs Harbour, No. 17523; Bernard Harbour, Nos. 17758-9; Mercy Bay, Miertsch. (Kew!); Russell Point, Nos. 17717-21. Victoria Island: Read Island, No. 17203; Wollaston Peninsula, barren limestone shingles, elevation 800 feet, No. 17227; *ibid.*, C.A.E., No. 574; Holman Post, dry sunny slope, No. 17315; Minto Inlet, Anderson (Kew!); head of Minto Inlet, dry sunny slope, No. 17407; *ibid.*, dry stony summit and rocky ledges of windblown hill, 500 feet elevation, No. 17408; Walker Bay, No. 17497; head of Prince Albert Sound, on dry sunny cliffs. Prince Patrick Island: Bruggemann, No. 40. Melville and King William islands (acc. to Simmons). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Diana Lake, head of Mokka Fd., Nos. 18706-10.

Potentilla rubricaulis undoubtedly is the most common representative of the genus in Banks and Victoria islands, where it is ubiquitous in sunny, stony, or gravelly places, such as cliffs, screes, and raised beaches, and flourishes even on the most barren and sterile limestone plateaux. Its growth-form varies considerably according to the habitat. Thus, on south-facing cliffs and screes, where an abundant snow cover is assured during the winter, the typical form is found; this is a large plant with erect or arching flowering stems 25 to 30 cm. high and often dichotomously branched from below the middle, the ultimate branches 5 to 10 cm. long, terminating in large, very showy flowers. In exposed, wind-swept habitats, on the other hand, *P. rubricaulis* forms low, compact cushions in the manner of *P. Vahliana*; in such places the flowering axes are reduced and frequently may have the appearance of being scapose and 1-flowered; a closer examination, however, will always reveal the presence, below the flower, of undeveloped, short-peduncled or almost sessile flower buds. This condensed arctic form is undoubtedly Simmons' var. *arctica* (Simmons, 1906, p. 51), whereas the plant Simmons illustrated (l.c., tab. 5), except for the somewhat longer and denser pubescence of leaves and stems, characteristic of the plant inhabiting the arctic islands, is typical *P. rubricaulis* as, indeed, a comparison with the type in Kew Herbarium or with Lehmann's fine plate (Revisio, tab. 30) will at once confirm. By his var. *arctica* Simmons clearly intended merely to call attention to the low-grown and reduced arctic form; but while doing this he failed to make it clear that this was by no means the only form of *P. rubricaulis* occurring in the high

Arctic. In consequence, var. *arctica* has been the cause of much misunderstanding and speculation, particularly because good and authentic material of *P. rubricaulis* has long been lacking in most arctic herbaria.

In reduced dwarf specimens of *P. rubricaulis* and in its "var. *arctica*", the basal leaves may appear ternate and digitate when the plant superficially resembles *P. Vahliana* or even a hirsute form of *P. nivea*; but a closer examination will nearly always show the presence of a rachis and of a second, often very much reduced, pair of leaflets. Furthermore, *P. rubricaulis* and its "var. *arctica*" may be distinguished from all forms of *P. nivea* by the constant presence of long, silky, white guard hairs above the white tomentum that covers the underside of the leaves and the petioles. Very characteristic also in all forms of *P. rubricaulis* is the manner in which these guard hairs are drawn out into soft pointed tufts, which project beyond the tip of each tooth of the leaflets.

Ostenfeld (1923), who had not seen the original material on which Lehmann's description and plate, as well as Wolf's more detailed discussion, were based, concluded that the arctic plant, which he knew from Greenland specimens and from material collected in Ellesmere Island by Simmons, was not conspecific with *P. rubricaulis*. In reaching this decision he was much influenced by the shape of the styles in the arctic plant which did not agree with Wolf's (1908) description of the styles in *P. rubricaulis*: "conicus, valde verrucoso-papillosus" and later in the discussion "kegelformig und vom Grunde fast bis zur Spitze mit langen Papillen besetzt". This description is quite misleading, for in neither fresh nor dried material of *P. rubricaulis* can the styles be said to be more than thickened and papillose at their base. Actually there is no marked difference between the shape of the styles in typical *P. rubricaulis* from Great Bear Lake or Banks and Victoria islands, *P. rubricaulis* var. *arctica* from Ellesmere Island, or *P. Pedersenii* from Greenland. Ostenfeld (l.c.) described the styles of the latter as "slender and slightly incrassated at the basal part which is covered with papillae" and in figure 4 (6-10) illustrated carpels and styles from the north coast of Greenland and from Ellesmere Island. The drawings were obviously made from immature carpels, for when fully mature the length of the style in *P. rubricaulis*, and in the Greenland plant as well, equals that of the carpel.

In his reasoning for taking up *P. Pedersenii* (Rydb.) Rydb. for the arctic plant, Ostenfeld was further misled by Simmons into thinking that the latter's description of *P. rubricaulis* and the very fine photograph (Simmons, l.c., tab. 5) were all intended for the var. *arctica* Simm. This is very understandable because Simmons, in turn, had been misled by Rydberg (1898), who had entirely misunderstood *P. rubricaulis* of Lehmann, and referred to that species a quite distinct Rocky Mountain plant, which (1908), when realizing his error, he renamed *P. rubripes*. This caused Simmons (1906) to think that "a continuous transition" existed between true *P. rubricaulis* Lehm. from Great Bear Lake, Rydberg's false *P. rubricaulis* from Alberta, Colorado, and Wyoming (*P. rubripes*), and "the most reduced arctic forms with only 3-digitate leaves" (*P. rubricaulis* var. *arctica* Simm.).

Ostenfeld, therefore, was not convinced that the arctic plant that Simmons had collected in Ellesmere Island was conspecific with Lehmann's *P. rubricaulis* for the Great Bear Lake region, or with Rydberg's plant from the

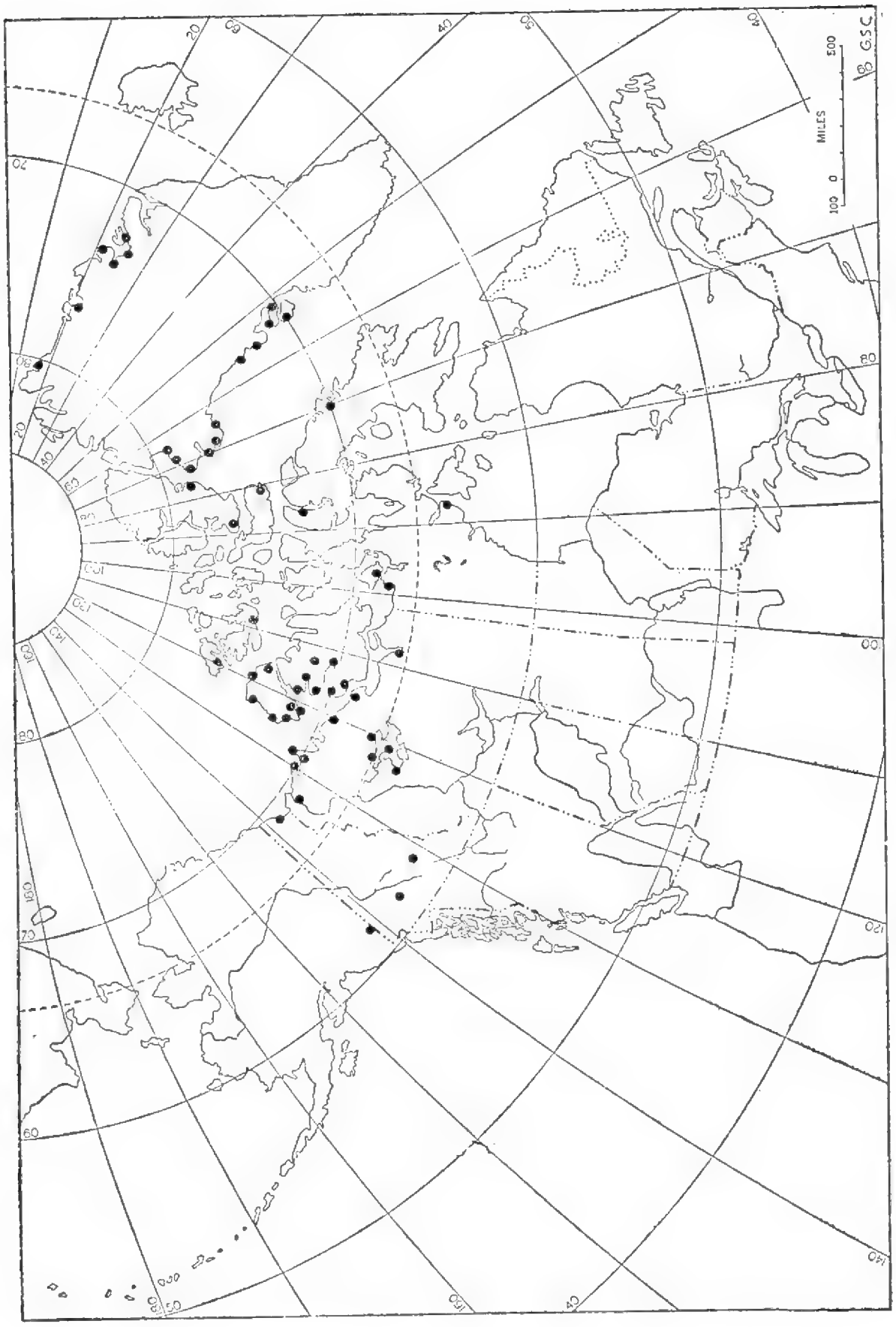

Figure 21. Total range of *Potentilla rubricaulis* Lehm.

Rocky Mountains. He realized, on the other hand, that it could not be separated from a plant collected at Assuk on Disko Island in west Greenland (Morten Pedersen, No. 470), which Rydberg (1901) had originally described as *P. subquinata Pedersenii* but later (1908) gave specific rank as *P. Pedersenii* (Rydb.) Rydb. As shown by Ostenfeld and others, Rydberg unfortunately referred to his *P. subquinata Pedersenii* a number of other and quite unrelated Greenland plants. Wolf and others who had seen these, but not the type, therefore did not recognize the presence in Greenland of true *P. rubricaulis*.

An examination of the type of *P. subquinata Pedersenii* in the herbarium of New York Botanical Garden, as well as of duplicates of the type (Herb. M. P. Porsild, Copenhagen and Nat. Herb. Canada) at once shows that it cannot be separated from dwarfed, high-arctic specimens of *P. rubricaulis*. *P. Pedersenii* therefore is a synonym for *P. rubricaulis* but if applied to a variety of *P. rubricaulis* has priority over var. *arctica* Simm.

As previously stated, *P. rubricaulis* varies considerably according to the habitat, and the writer believes the dwarf arctic plant to be no more than an extreme ecological variation. This is in agreement with Hultén (1945), who considered *P. Pedersenii* Rydb. a straight synonym of *P. rubricaulis*. Hiitonen, l.c., on the other hand, reduced *P. rubricaulis* Lehm. and *P. villosa* Pall. to subspecies of *P. nivea* L.; the latter view seems most unrealistic and contrary to the opinion of all earlier students of *Potentilla*, who have agreed that *P. rubricaulis* and *P. villosa* are not even closely related to the *P. nivea* group.

Distribution: Arctic North America from high mountains of Yukon, Mackenzie Delta, Great Bear Lake across the Arctic Archipelago to northernmost W. and E. Greenland. The type came from Great Bear Lake.

Potentilla Vahliana Lehm.—Simmons, 1913, p. 107.

Banks Island: Cape Lambton (photographed); summit of high plateau between Nelson Head and Masik Pass, elevation 2,400 feet, No. 17776; Storkerson Bay, Manning and Macpherson, Nos. 134-5; Mercy Bay, Manning and Sparrow, No. 219; Russell Point, very scarce and mostly on windswept hill-tops and on the sides of owl perches, Nos. 17714-5. Victoria Island: Noted at Read Island and at Holman Post. Prince Patrick Island: Mould Bay, MacDonald, Nos. 31 and 162. Melville Island (acc. to Simmons). Isachsen Island: Heywood, No. 19. Axel Heiberg Island: Head of Diana Lake, No. 18711; Hyperite Point (acc. to Simmons). King William Island: Larsen, No. 37. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common in gravelly, windswept places and on dry, rocky slopes. Often forming large, soft, and easily broken cushions which for a short time each season are covered by large, showy flowers.

As noted by the writer (Porsild, 1951), *Potentilla Ledebouriana* Porsild (*P. uniflora* Ledeb.) and *P. Vahliana* Lehm. in some parts of their ranges resemble each other and, therefore, have frequently been confused (Wolf, 1908), whereas in the Canadian Rocky Mountains *P. Ledebouriana* is not at

all critical, and in west Greenland the same is true of *P. Vahliana.* Both species have been studied repeatedly by monographers of the genus, as well as by those who have dealt with the floras of arctic parts of North America. Unfortunately, few of those who have written about them have had adequate and well-preserved material of both species, and none, to my knowledge, has had experience with both species in the field. While few of those who have dealt with *P. Ledebouriana* and *P. Vahliana* have been in complete agreement as to their systematic position, none has suggested that they were conspecific; some writers have reduced *P. Vahliana* to a variety of *P. nivea,* and Th. Wolf considered *P. Ledebouriana* a variety of *P. nivea* (*P. nivea* var. *uniflora* Th. Wolf). Hiitonen (1947), on the other hand, made the combination *P. uniflora* ssp. *Vahliana,* possibly influenced by Wolf who (l.c., p. 247) noted: "Die Spezies steht unstreitlich der *P. nivea* var. *uniflora* am nächsten und wurde von den amerikanischen Floristen ofters mit dieser verwechselt oder zusammengeworfen; sie unter scheidet sich aber von dieser schon durch ihre gelbliche und dichtere Zottenbehaarung, noch besser durch ihre breiten, oft elliptischen aussern Kelchzipfel, welche den innern fast gleich sind (bei *P. nivea* kleiner und viel schmaler)."

In some parts of Alaska, but also in Yukon, dwarfed and condensed forms of *P. Ledebouriana* undeniably may resemble *P. Vahliana* or dwarf forms of *P. villosa.* Hultén (1947) believed both to be present in Alaska and Yukon, but on phytogeographical grounds alone it seems rather doubtful that true *P. Vahliana* could occur there. In northern Alaska and northeast Yukon, where the range of *P. Ledebouriana* overlaps that of *P. rubricaulis,* poorly collected material of *P. Ledebouriana* may give some difficulty, and in northwest Greenland and in the Canadian Arctic, dwarf forms of *P. rubricaulis* may occasionally resemble *P. Vahliana.*

Rydberg (1898), who must have known *P. Ledebouriana* well, has given a good description, which like his excellent illustration (tab. 35, figs. 3-7) undoubtedly was based upon Rocky Mountain material (Compare also Plate XXI, figures 1-4, showing typical *P. Ledebouriana* from Canadian Rocky Mts). The ranges ascribed to these species by different writers vary considerably. Thus, in his latest revision, Rydberg (1908) gave the range of *P. Ledebouriana* (*P. uniflora*) as: "Arctic-alpine regions: E. Asia, and in America from Alaska to Oregon, Colorado, and on the arctic coast to Coppermine River; perhaps also in Greenland"; and for *P. Vahliana* "Greenland, Hudson Bay region, and arctic coast of America; also Herald Island".

Wolf (l.c.) says of *P. Vahliana*: "Die Spezies is ausschlieslich arktisch und beschränkt sich auf Grönland, das arktische Nordamerika und die diesem nahe gelegenen Inseln (Unalaschka). In ganz Asien fehlt sie bis jetzt. . . auch Lehmann's Angabe nach Drummond: 'in dry and elevated ridges of the Rocky Mountains between 52° and 56°' ist sehr zu bezweifeln; es dürfte sich hier um eine Verwechslung mit der *P. nivea* var. *uniflora* handeln. Der südlichste Punkt von dem ich sie besitze ist die Insel Sitka. . . ." For *P. Ledebouriana* (*P. nivea* var. *uniflora*) Wolf gives the following range:

"In Asien kommt die var. uniflora nur in den nordostlichsten Amerika zunächst gelegenen Gegenden in der Nähe der Beeringstrasse vor; (ein Exemplar sah ich noch von einen Punkt in der Nähe der Lenamündungen). Ihre eigentliche Heimat is das arktische Nordamerika und das Hochgebirge der Rocky Mountains vom aussersten Norden bis nach Colorado." Hultén (1945), when discussing *P. uniflora* remarks that specimens occur in Alaska-Yukon which "can only arbitrarily be separated from *P. Vahliana*". The range given by him for *P. uniflora* is "Eastern Siberia from the mouth of Lena R. to Chukch Penins. and Kamtchatka, in America in the mts. from Alaska to Oregon and Colorado". This essentially is the same as that given by Wolf (l.c.) except that Hultén has left out the "aussersten Norden"; this undoubtedly is correct, for *P. Ledebouriana* (*P. uniflora*) does not belong in the "Arctic-Montane" group in which Hultén (1937) placed it, but in the group that he called "Beringian radiants", of which very few reach east of the Mackenzie.

Hultén (1945) considered *P. Vahliana* "merely the arctic race of the montane *P. uniflora*" but in his Alaska Flora (1946) maintained it under specific status with the following range: "Asia: Wrangell I., Herald I., Arakamtchetchen I. (Chukch Penins.). America: From Alaska and Yukon over Melville I. and northern Ellesmereland to Baffin Land and N.W. Labrador Penins. south to the Arctic Coast and middle Hudson Bay". The omission of Greenland is undoubtedly unintentional, since that country is quoted by him as the type locality. Hultén (1937) placed *P. Vahliana* with the group he called "Rigid American radiants of Northern Beringia" (map 11). More likely it should be placed with the group that the writer (Porsild, 1951, a, map 9) called "Arctic Archipelago radiants", which included such plants as *Potentilla rubricaulis*, *Oxytropis arctica*, *Parrya arctica*, *Braya Thorild-Wulffii*, and many others, of which several have reached northwest Greenland, few crossed the Mackenzie, and none reached Bering Strait.

Potentilla Ledebouriana and *P. Vahliana* clearly are plastic species that vary considerably in growth-form and habit, as well as in the morphological characters upon which they are separated in the herbarium. In dealing with *P. Vahliana* in Ellesmere Island, Simmons (1906) clearly had no difficulty, for he remarks: "Even in a sterile state, the species is very easily distinguished already from afar; its large, densely-packed, hemispherically-tufted individuals immediately catching the eye, as they stand spread over the ground, sometimes with only the naked earth between them". *P. Ledebouriana* may sometimes form such large tufts, but they are never so dense and always lack the yellowish tinge imparted to tufts of *P. Vahliana* by the long, silky, yellowish indument that covers nearly all parts of that plant (Compare Wolf, l.c.).

In searching for a character more constant than those noted above, by which to separate *P. Ledebouriana* and *P. Vahliana* in the herbarium, it was found that in the former the base of the style is very much thickened and glandular-papillose, as in the Sect. *Multifidae*; whereas

in *P. Vahliana* the base of the style that Wolf (l.c.) described as "coniformis" is scarcely enlarged and scarcely, if at all, glandular or papillose.

In the writer's experience, specimens of *P. Ledebouriana* and *P. Vahliana* may thus be separated on the following characters:

	P. Ledebouriana	*P. Vahliana*
style base	thickened, glandular-papillose	barely thickened and not glandular-papillose
calyx lobes	lanceolate	broadly lanceolate-elliptic
bractlets	linear-oblong	lanceolate
indument of underside of leaves	grey tomentum visible through cover of long, pure-white and silky hairs	densely covered by long, yellowish-white hairs through which the tomentum is not visible
hairiness of plant in general	not generally hirsute	nearly all parts covered by long, yellowish-white hairs

Distribution: From Cape Dalhousie east of the Mackenzie River across northern Mackenzie and Keewatin to northern Hudson Bay region and Baffin Island, north across the arctic islands to beyond lat. 82° N. in Ellesmere Island, northern W. Greenland, south to lat. 67°. Lacking in E. Greenland.

Geum Rossii (R. Br.) Ser.—Simmons, 1913, p. 106.

Melville Island: Winter Harbour, Sabine (Kew!). Central west coast of Ellesmere Island, Slidre Fd., P. F. Bruggemann, Nos. 559, 640, and 720 (DAO).

The occurrence of *Geum Rossii* in Melville Island, isolated by more than eight hundred miles from its nearest station on the mainland, in Brooks Range, Alaska, has long been a puzzle to plant geographers. But even more puzzling have been J. D. Hooker's (1860) unverified reports of it from Devon Island in Lancaster Sound and from Greenland, and his likewise unverified report (1857) of *Geum Rossii* among Rae's plant collected on his journey in 1851 from Great Bear Lake via Coronation Gulf to the south coast of Victoria Island. When examining the arctic North American plants in the herbaria at Kew and the British Museum (Natural History) in 1950 and 1954, the writer was interested, therefore, to see if specimens might be found there substantiating Hooker's reports. In this I was unsuccessful, for the only *Geum* (or *Sieversia*) *Rossii* from Arctic Canada were three collections from Melville Island, all at Kew, the first two collected by Sabine and Beechey, the third merely labelled "Ex. herb. Trevelyan". The Sabine plant apparently is the type. With it, on the same sheet, is mounted a specimen of *Potentilla Egedii*, labelled "Between Coppermine and C. Alexander, Rae 1851". The leaves and flowers of *Potentilla Egedii* undeniably bear some resemblance to those of *Geum Rossii*; at any rate Hooker's unverified report of *Sieversia* (*Geum*) *Rossii* in the Rae collection was obviously based on this specimen of *Potentilla Egedii*, as that species is not otherwise listed in the collection. Possibly then, Hooker's report of *Sieversia Rossii* from N. Devon Island and Greenland may be due to a similar

lapsus. Since no one has rediscovered *Geum Rossii* anywhere in the Arctic Archipelago for 133 years, its recent discovery by Mr. Bruggemann at Slidre Fd. in Ellesmere Island is of the greatest phytogeographic interest.

Otherwise *Geum Rossii* is known from eastern Asia and from unglaciated parts of Alaska and Yukon. In the southern Cordillera, separated by a gap of more than 1,000 miles, *G. Rossii* is represented by the very closely related *Acomastylis depressa* Greene of Washington, *A. gracilipes* (Piper) Greene, of Oregon (each known only from the type collection), and by *A. turbinata* (Rydb.) Greene, known from high mountains of Montana, New Mexico, Arizona, and Nevada. The last differs scarcely from *G. Rossii*; indeed some specimens in the National Herbarium of Canada (e.g. Pike's Peak, Colorado, altitude 12,000 feet, July 23, 1878, Addison Brown) seem quite indistinguishable from the Alaska and Yukon plant.

General Distribution: Beringian bilateral. From east Asia across unglaciated Alaska and Yukon with isolated stations in Melville Island, (Type locality), and in Ellesmere Island.

Dryas integrifolia M. Vahl—Simmons, 1913, p. 105.

(Map, fig. 9, p. 39)

Banks Island: De Salis Bay, Manning and Macpherson, No. 71; Cape Lambton, No. 17583; *ibid.*, Manning and Macpherson, No. 92; Sachs Harbour, Manning and Sparrow, Nos. 242-3; Castel Bay, *idem*, No. 181; Mercy Bay, *idem*, No. 218; Russell Point, No. 17703. Victoria Island: Holman Post, No. 17311; Minto Inlet, Anderson (Kew!); Cambridge Bay, Fortier, No. 15; northeast corner of island, Jenness, No. 37. Prince Patrick Island: Mould Bay, MacDonald, Nos. 32, 155-6. Melville Island: Liddon Gulf, Jenness, No. 28. Prince of Wales Island: Fortier, Nos. 39 and 78. Axel Heiberg Island: Diana Lake, head of Mokka Fd., Nos. 18701-2. King William Island: Larsen, No. 36; Fortier, No. 87. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Dryas integrifolia undoubtedly is the most common and ubiquitous vascular plant in Banks and Victoria islands, where it is dominant everywhere in dry tundra, but especially on barren, stony solifluction flats and slopes. In the latter places it is indeed among the very earliest and most successful pioneers and readily establishes itself along the frost cracks of polygon fields. In this it is undoubtedly greatly aided by lemmings who feed on *Dryas* seeds and undoubtedly help to disseminate them along the frost cracks which they use as runways. Its growth-form and the ability of *Dryas* to produce adventitious roots make it particularly successful in surviving the vicissitudes of frost-heaved and slipping soils.

Dryas integrifolia flowers abundantly and in normal seasons matures seeds. In 1949, however, the seed crop failed almost completely; in northern Banks Island the species had only reached anthesis a short time before killing frost occurred.

For a short time, at the height of the flowering season, the flowering *Dryas* transforms the otherwise barren and desolate stony flats of Banks and Victoria islands into a most spectacular carpet of creamy white flowers, often interspersed by "islands" of the almost equally common purple-flowered *Oxytropis arctica*.

General Distribution: Arctic-alpine. North America from Bering Strait to east Greenland, north beyond lat. 83° N., south through Alaska, Yukon, and the Rocky Mountains to Jasper, Great Slave Lake, Hudson and James bays, and Ungava, with isolated stations south to Montana, Lake Superior, Gulf of St. Lawrence, and Newfoundland.

Dryas? punctata Juz.

Banks Island: Minto Inlet, Anderson (Kew!). Melville Island: McClintock, 1853 (Kew!).

The presence in the Arctic Archipelago of a second species of *Dryas* was discovered only after the main body of this paper had gone to print. It is inseparable from the east Greenland plant that the writer (Porsild, 1947), perhaps erroneously, referred to *D. punctata*. It is probably *D. octopetala* var. *minor* sensu Juz., not Hook. in Trans. Linn. Soc. 14 : 387 (1824) and almost certainly *D. incisa* Juz., ad interim in Bull. Jard. Princip. d'U.R.S.S. 28 : 315 (1929), illustrated in Fl. U.R.S.S. X, tab. XX, fig. 2, 2a and b.

LEGUMINOSAE

Lupinus arcticus Wats.—Simmons, 1913, p. 109.

Banks Island: Ballast Beach. A sterile rosette collected August 1850, by Miertsching (Kew!). Victoria Island: South coast, Rae (Kew!).

Although Simmons (l.c.) had failed to locate the Rae and Miertsching specimens, both are actually preserved at Kew. The species must, however, be quite rare or local in Victoria and Banks islands, for, although assiduously looked for in all likely places, neither the writer nor later collectors have rediscovered it there.

General Distribution: Arctic-alpine of western North America. From Bering Strait east to western Keewatin, north to the Arctic Coast and Victoria and Banks islands, south through mountains of Yukon to northern British Columbia.

Astragalus alpinus L.—Simmons, 1913, p. 109.

Banks Island: De Salis Bay, Manning and Macpherson, No. 8; Storkerson Bay, *idem*, No. 136; Cape Crozier, *idem*, No. 167; Castel Bay, Jenness, No. 54; Mercy Bay, Manning and Sparrow, No. 220; Russell Point, No. 17722. Victoria Island: Read Island; Wollaston Peninsula, C.A.E., No. 388; Holman Post; Minto Inlet and Cambridge Bay, Anderson (Kew!); head of Minto Inlet, No. 17409; head of Prince Albert Sound. Prince Patrick Island: Mould Bay, MacDonald, Nos. 33 and 163-5. Melville Island: Sabine (acc. to Simmons). King William Island: Larsen, No. 40. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common in moist sandy and gravelly places, especially along lake shores and on sea beaches above high-tide mark.

Distribution: Circumpolar, arctic-alpine. In North America from Bering Strait to Baffin Island and Labrador but absent in Greenland; in the Archipelago extending north to Prince Patrick Island; south to Newfoundland, Lake Superior, and in the Rocky Mountains to Colorado.

Astragalus Richardsonii Sheldon in Minn. Bot. Stud. 1:126 (1894).

A. vaginatus Richardson in Frankl. 1st Journey 746 (1823); Hooker, Fl. Bor.-Am. 1 : 149 (1834), not *A. vaginatus* Pall. Spec. Astrag. n. 49, tab. 36 (1800).

A. aboriginorum, Simmons, 1913, p. 109, and subsequent Am. auth. as regards the plant of arctic Canada, not *Phaca aboriginorum* Richards. in Frankl. 1st Journey 746 (1823), nor Hooker, Fl. Bor.-Am. 1 : 143 (1834) tab. 56, nor *Atelophragma aboriginum*, Rydb. Bull. Torr. Bot. Cl. 32 : 660 (1906) or N. Am. Fl. 24, 6 : 366 (1929).

Phaca aboriginorum, J. D. Hooker, 1857, p. 121, not Richards.

It has long been apparent to the writer that the North American arctic plant that has passed for *Astragalus aboriginorum* Richards. cannot be conspecific with the plant for which Richardson intended that name. Richardson, during the Franklin Expedition, 1819–22, collected two plants that he realized were closely related but nevertheless distinct. The first (l.c. p. 746) and more northern, for which he gave the range as "Barren Grounds from Point Lake to the Arctic Sea", he erroneously referred to "*A. vaginatus*: Pall. Astr. n. 49, t. 36". Sheldon (l.c.), who realized that the American plant was distinct from the Siberian *A. vaginatus* Pall., renamed it *A. Richardsonii* but gave no description and cited no specimens. Perhaps largely on account of lack of specimens and field experience with the arctic plant, subsequent writers have followed J. D. Hooker (1857), who apparently was the first to apply the epithet "*aboriginorum*" to the arctic plant collected on Banks and Victoria islands by Anderson, Miertsching, and Rae. The true *A. aboriginorum* Richards. is a prairie species. For it, Richardson (l.c., p. 746) gave the following description: "285. *A. aboriginorum*: suffruticosus erectus canescens, foliis sessilibus, foliolis 6-jugis lanceolato-linearibus, racemis axillaribus laxis foliis longioribus. (C.) (Sandy plain in the neighbourhood of Carlton [on the Saskatchewan River, Saskatchewan] strongly resembling the plains of the Missouri . . . .)"

This brief description, which applies equally well to the arctic plant and to that of the prairies, is followed by a more detailed one following the opening phrase "Praecedenti similis" that brings out a number of important characters not possessed by the arctic plant. Richardson thus mentions the long, yellowish roots, similar to those of *Glycyrrhiza*, and gathered in the spring by Cree and Stoney Indians, as an article of food. He also describes the immature legumes as being covered by appressed, whitish-grey hairs.

Eleven years later, W. J. Hooker, l.c., under *Phaca Aboriginorum*, copied Richardson's original diagnosis and added a description of the mature fruit now said to be glabrous. In his rather idealized drawing (tab. 56) even the young fruits are shown to be totally glabrous.

On page 149, Hooker copied the brief description of *Astragalus vaginatus* given in DeCandolle (Prod. 2:283), remarking that "the habit of this is so very similar to that of our *Phaca Aboriginorum* (*Astragalus Aboriginorum*, Rich., next to which Dr. Richardson has ranged it) that, were the fruits discovered, it would probably prove to be a *Phaca* also. The only specimen I have seen has the flowers larger than in *P. Aboriginorum*".

The range of *Phaca Aboriginorum*, as known to Hooker, extended "from Lake Winnipeg to the Rocky Mountains, and as far north as Great Bear Lake, in Lat. 66°".

In the Great Bear Lake region the ranges of the prairie species and that of the arctic plant overlap, and the material from which Hooker's tab. 56 and his description of *Phaca Aboriginorum* were drawn may have been a mixture; nevertheless, the relatively small flowers, which in life average about 1 cm. in length, and the long-stipitate legumes drawn by the artist are characteristic of the prairie species for which Richardson clearly intended the epithet "*aboriginorum*".

In the arctic plant that Richardson erroneously referred to the Siberian *A. vaginatus* Pall., the inflorescence is more compact and the flowers average 1·5 cm. in length; the legumes are perfectly glabrous even in youth; the stipe of the mature legume is short, and the body is never free from the calyx. The stipules are characteristically black-hirsute, and the root is tough and woody, not at all edible as in *Glycyrrhiza*. This is the plant shown by Holm's excellent drawing in Macoun & Holm, l.c., tab. 10, showing flowering specimens from Bernard Harbour and Pt. Epworth (Tree R.) of Dolphin and Union Strait and Coronation Gulf (C.A.E., Nos. 310 and 394A). Figure 4, representing a fruiting raceme, may have been drawn from samples of last year's fruits, no longer preserved.

There can be little doubt then that this plant is specifically distinct from the prairie species. *Astragalus Richardsonii* Sheldon is the first name available for it and must be applied to the arctic plant. The following description is drawn from the large suite listed below, supplemented by notes made in the field from live specimens.

Perennial, with a stout, woody tap-root; stems numerous, crowded, erect-ascending, greenish brown cinereous-villose, 15 to 20 cm. high. Leaves 5 to 8 cm. long, their stipules prominent, oblanceolate, connate at the base, green, glabrous above, densely black hirsute below, glabrate in age, 6 to 7 mm. long; leaflets 9 to 13, linear-lanceolate, acute, sessile, 15 to 20 mm. long, 3 to 5 mm. wide, hoary cinereous, in age glabrate above. Peduncles axillary, erect, somewhat flexuous, 5 to 8 cm. long, cinereous-villose; inflorescence 10- to 20-flowered, at first dense and subcapitate, in fruit somewhat elongated, from 2 to 5 cm. long; pedicels 1 to 2 mm. long, bracts linear, densely black-villose, soon wilting; calyx densely black-villose, the tube 5 mm. long, the subulate teeth about 2 mm. long; corolla 15 mm. long, creamy white or with a pinkish tinge, the tip of the keel deep-purple; legumes glabrous even in youth, strongly inflated at maturity, somewhat flattened, about 20 mm. long, purplish brown, the stipe distinctly shorter than the calyx.

The following specimens of *A. Richardsonii* are typical. In the absence of a holotype, the first number is designated the neotype:

Franklin District. Banks Island: Cape Lambton, flowering specimens, on July 30, Porsild, No. 17587; De Salis Bay, Manning and Macpherson Nos. 37 and 45; Prince of Wales Strait, south of Russell Point, fruiting specimens on August 23, Porsild, No. 17768; Mercy Bay, M'Clure (Kew!).

Victoria Island: Read Island, Porsild, No. 17204; Minto Inlet, Anderson (Kew!); head of Prince Albert Sound, Miertsch. (Kew!); Cambridge Bay, Anderson (Kew!), and Fortier, No. 21.

Mackenzie District: Bernard Harbour, C.A.E., Nos. 310 and 331A (the last distributed as *A. frigidus* var. *littoralis*); Coronation Gulf, Port Epworth, *idem*, No. 394A; Bathurst Inlet, Kelsall and McEwen, No. 81; Great Bear Lake, north shore of Dease Arm, A. E. and R. T. Porsild, Nos. 4704, 4746, and 4901; Cape McDonnel, *idem*, No. 5154; summit of Scented Grass Hills Peninsula, flowering specimens on July 21, Porsild, No. 17111.

Astragalus Richardsonii grows in gravelly places often along lake shores and river-banks, or on shingle beaches of the sea shore above the high-tide mark. It appears to be endemic to the western islands of the Archipelago, Coronation Gulf area, and Great Bear Lake. It is undoubtedly closely related to *A. aboriginorum*, and on Great Bear Lake probably hybridizes with it. That species extends north from the Saskatchewan to Great Bear Lake and Coppermine River west to the Rocky Mountains, northwestward into Yukon and Alaska, where several races or closely related species occur. One of them, *A. linearis* (Rydb.) Porsild, is distinguished, *inter alia*, by its appressed-strigose canescent or even glabrous stems and leaves and by longer teeth of the very short calyx. According to Hultén, Fl. Alas. & Yukon, p. 1080, *A. aboriginorum* has been reported from E. Asia; it is, however, not listed by Gontscharov in Fl. U.S.S.R. In Gaspe the closely related endemic, *Astragalus scrupulicola* Fern. & Weath., Rhod. 33 : 238 (1931) differs from *A. aboriginorum* by its permanently pubescent and narrower legumes and whitish grey pubescence of the calyx (Compare Fernald & Weath.).

General Distribution of *A. Richardsonii*: Endemic of arctic Mackenzie District and westernmost islands of the Arctic Archipelago.

Oxytropis arctica R. Br.—Simmons, 1913, p. 112.

O. coronaminis Fernald in Rhod. 30 : 151, tab. 175 (1928).

O. Roaldii, sensu Macoun & Holm, 1921, p. 17, tab. 8, fig. 2, not Ostenf.

O. nigrescens, sensu Simmons, l.c., p. 112, not Pall.

O. Bellii, sensu Simmons, l.c., p. 111, not Britt.

For a discussion of the species and its synonymy *see* Porsild in Sargentia 4 : 51-52 (1943).

Franklin District. Banks Island: De Salis Bay, Manning and Macpherson, No. 54; Cape Lambton, flowering specimens, July 30, No. 17589; Nelson Head, summit of plateau toward Masik Pass, 1,900 to 2,400 feet elevation, No. 17777; Sachs Harbour, Manning and Sparrow, No. 244; Castel Bay, *idem*, No. 182; Baring Land, M'Clure, 1852 (Kew!); Bay of

Mercy, Miertsch., 1852–3 (Kew!); Russell Point, flowering specimens, August 13-20, No. 17723; Prince of Wales Strait, 20 miles south of Russell Point, fruiting specimens, August 23, No. 17769. Victoria Island: Read Island, No. 17205; south coast, Wollaston Peninsula, C.A.E., No. 387; south coast, Rae, 1853 (Kew!); head of Minto Inlet, No. 17410; Cambridge Bay, Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, No. 34. Melville Island: leg. Mr. Beverley, with a note probably by Robert Brown, reading: "Common, W. C. Trevelyan. certe nov. sp.", which suggests that this be considered the type. On the same sheet is a specimen collected by Capt. Sabine (both Kew!); *ibid.*, coll. Capt. McClintock (Kew!); J. G. McMillan, July 6, 1909, CAN, No. 77294.

Mackenzie District. Arctic Coast: Mackenzie Delta, Richardson Island, No. 16839; Cape Dalhousie, A. E. and R. T. Porsild, Nos. 2779B and 2780; Point Drew, Jones Island and Cape Bathurst, Miertsch., 1850 (Kew!); Point Maitland, M'Clure, 1850; arctic coast west of Cape Bathurst, August, 1850, Capt. Pullen (Kew!); Bernard Harbour, C.A.E., Nos. 321A and 6; *ibid.*, R. M. Anderson, July, 1915; Coronation Gulf, Epworth Harbour, C.A.E., Nos. 393 and 395; arctic sea-coast, Richardson [Type of *O. coronaminis* Fern. (Gray H.) (isotype in Kew!)]; between Coppermine and Cape Alexander, Rae, 1851 (Kew!); west side of Bathurst Inlet, Kelsall and McEwen, Nos. 30 and 189; Kent Peninsula, August 13, 1926, Hoare; Great Bear Lake, north shore of Dease Arm, A. E. and R. T. Porsild, No. 4745; lat. 64° 10′ N., long. 113° 04′ W., J. Carroll; lat. 64° 30′–65′ N., long. 115°117′ W., C. S. Lord, No. 5. Upper Back River, 65° 23′ N., 105° 30′ W., P. Lawson, Nos. 166 and 176; Lower Thelon River, 64° 40′ N., 102° 25′ W., *idem*, No. 161.

Keewatin District: Interior south of Ogden Bay, 66° 50′ N., 101° 45′ W., P. Lawson, No. 165.

A comparison of the type of *O. arctica* with that of *O. coronaminis* reaffirms the writer's earlier conclusion (Porsild, 1943) that *O. coronaminis* cannot be maintained as specifically distinct from the somewhat variable *O. arctica*.

When describing his "new" species, *O. coronaminis*, Fernald (l.c.) compared it with a plant that he erroneously took to be a duplicate of type of *O. arctica*, illustrated on tab. 172 (l.c., upper). The photograph shows a single stem of an *Oxytropis* with rather small flowers and narrow leaves with about 17 to 19 leaflets. This specimen bears but slight resemblance to *O. arctica*. As pointed out by Polunin (1940, p. 292) the plant that Fernald took to be a duplicate of the type of *O. arctica* actually belonged with a set of plants collected on Parry's 2nd voyage and came "from the Hudson Strait and Foxe Basin regions (especially from Melville Peninsula) instead of from Melville Island". The identity of this plant is not clear, but its relation to *O. arctica*, otherwise not now known in the Hudson Bay region, is at best very problematic.

Oxytropis arctica, long among the rarest of plants in arctic herbaria is actually one of the commonest plants on Banks and Victoria islands, where it is ubiquitous on dry, open tundra and on the flat, windswept, stony barrens. So common is it that for a few weeks each summer its large purple flowers turn these otherwise dreary and desolate plains into veritable "flower gardens". The following description is drawn from live specimens growing in northern Banks and Victoria islands:

Densely caespitose from a many-headed, stout tap-root, often forming cinereous-grey cushions 20 to 30 cm. in diameter. Leaves 4 to 6 cm. long, usually with from 9 to 11 leaflets, these opposite, oblong-lanceolate, 9 to 10 mm. long, 3 mm. wide, densely white-villose beneath, glabrate above; rachis and petiole, but especially the base of the stipules shaggy from long, snowy white, or sometimes slightly yellowish hairs, the free part of the stipules papery white and glabrous, long ciliate and with pale green veins. Scapes 8 to 10 cm. high, like the calyx and bracts cinereous grey from a dense undercoat of black hairs mixed with longer, shaggy white hairs. Inflorescence sub-umbellate, not elongating in fruit; flowers 3 to 5, very large and showy, sweetly perfumed. Calyx about 1·5 cm. long, the teeth subulate, about half as long as the tube. Corolla 2·5 cm. long, dark purple, turning blue in drying. Mature legumes falcate, erect or spreading, 3 cm. long, olivaceous owing to the spreading dark green pubescence. Foliage odourless.

Distribution: Endemic of the western Arctic Archipelago and the central arctic Canadian mainland.

Oxytropis arctobia Bunge—Simmons, 1913, p. 112. *See also* Fernald, Rhod. 30:152 (1928); Ostenf. 1910, p. 19, tab. 2, fig. 14.

Banks Island: De Salis Bay, Manning and Macpherson, No. 66; Cape Lambton, No. 17590; Sachs Harbour, flowering specimens, July 30, No. 17524; *ibid.*, Manning and Sparrow, No. 245; Russell Point, flowering and fruiting specimens, August 13-20, No. 17724. Victoria Island: Read Island, No. 17206; Holman Post; Minto Inlet, Anderson, 1852 (Kew!); head of Minto Inlet, fruiting specimens on exposed, rocky hill, August 2 and 3, No. 17411; Cambridge Bay, Anderson, 1853 (Kew!); Fortier, No. 18. Melville Island: (ex. herb. Trevelyan, Kew!). King William Island: Gjøa Expedition; *ibid.*, Larsen, No. 38. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common in rocky and gravelly places, where it forms large hemispherical cushions.

Distribution: Endemic of arctic North America. From Banks and Victoria islands over Melville Island to northern Baffin Island, south to northern Hudson Bay region and the arctic coast of Keewatin and Mackenzie, west to the north shore of Great Bear Lake.

Oxytropis glutinosa Porsild, in Nat. Mus. Canada Bull. 121: 240, tabs. 20 and 24 (1951).

Banks Island: Sachs Harbour south of Cape Kellett on the west coast, in sandy tundra, No. 17526.

The specimens, which flowered on July 30, are a close match for *O. glutinosa*, recently described from mountains of interior Yukon and Alaska, and since collected on the north slope of Brooks Range. Also known from Richardson Mountains west of Mackenzie Delta. *O. glutinosa* is perhaps most closely related to *O. viscida*, *O. ixodes*, and *O. hudsonica*. From the latter, *O. glutinosa* is at once distinguished by its very long, subulate calyx teeth.

Oxytropis hyperborea Porsild, in Sargentia 4 : 53 (1943); Bull. Nat. Mus. Canada 121 : 242, tab. 21, figs. 1 and 2 (1951).

O. campestris var. *sordida,* sensu Macoun & Holm, 1921, p. 16, at least in part.

Banks Island: Sachs Harbour, in dry, sandy tundra, No. 17525. Victoria Island: Wollaston Peninsula, C.A.E., No. 386; Holman Post on raised boulder beach, flowering and fruiting specimens on August 8, No. 17317.

Only seen as noted above.

Distribution: Endemic of northwestern Mackenzie, the westernmost islands of the Archipelago, and the arctic coast of Yukon.

Oxytropis Maydelliana Trautv.

O. campestris, Simmons, 1913, p. 110.

O. campestris var. *melanocephala,* Ostenf. 1910, p. 20.

Banks Island: The *O. campestris* reported by J. D. Hooker (1857) as collected by Anderson may be *O. Maydelliana* but could be *O. hyperborea.* I was unable to find the specimen in the London herbaria. However, the two Anderson collections from Victoria Island, likewise cited as *O. campestris* definitely are *O. Maydelliana,* as is a specimen from Melville Island "ex herb. W. C. Trevelyan" (Kew!). Victoria Island: Holman Post; Minto Inlet, Anderson, 1852 (Kew!); south coast, Rae, 1853 (Kew!); Cambridge Bay, Anderson, 1853 (Kew!); *ibid.,* Fortier, No. 22; west end of Tahoe Lake, No. 17455. Melville Island: (Kew!). King William Island: Larsen, No. 39; Gjøa Expedition (CAN). Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Rare or occasional in mossy tundra. Our specimens flowered on August 4 but had matured fruits the previous season.

Distribution: From east Asia across arctic and subarctic North America east to Baffin Island, north to Melville Island and Bylot Island, south to northern Ungava, northern Hudson Bay region, Great Bear Lake and mountains of northern British Columbia.

Hedysarum alpinum L. s. str.—Simmons, 1913, p. 113. *See* Porsild, Nat. Mus. Canada Bull. 121 : 248 (1951).

Banks Island: Cape Lambton, No. 17588. Victoria Island: Holman Post, in wet tundra, No. 17316; Minto Inlet, Anderson (Kew!); noted at head of Minto Inlet.

Our specimens belong to the rather poorly defined but clearly arctic Siberian and northwest American race distinguished by its short stature, short racemes of large flowers, and by its longer and more subulate teeth of the calyx. It is one of the few species of amphi-Beringian distribution reaching the Arctic Archipelago.

Distribution: East Siberia through arctic Alaska and Yukon to the Mackenzie River; southern Banks and Victoria islands. Isolated in high mountains of British Columbia and Alberta.

Hedysarum Mackenzii Richards.—Simmons, 1913, p. 113; Macoun & Holm, 1921, p. 17 (1921).

Banks Island: De Salis Bay, Manning and Macpherson, No. 60; Nelson Head, *ibid.*, No. 77. Noted at Cape Lambton; Ballast Beach, Miertsch. (Kew!). Victoria Island: Noted at Holman Post and at the head of Minto Inlet; Minto Inlet and Cambridge Bay, Anderson (Kew!); Wollaston Peninsula, C.A.E., No. 389.

Occasional to common in well-watered, calcareous, alluvial, sandy, and gravelly places.

Distribution: Asia over Alaska-Yukon to west shores of Hudson and James bays, north to the Arctic Coast, Banks and Victoria islands, south through Mackenzie lowlands and foothills beyond the Canadian boundary. Isolated on Anticosti Island and Newfoundland.

LINACEAE

Linum Lewisii Pursh.—Simmons, 1913, p. 113.

Victoria Island: Minto Inlet, Anderson (Kew!); head of Minto Inlet, flowering specimens on August 2 with last year's capsules, No. 17417.

The specimens grew on a rocky ledge above the nest of an American rough-legged hawk. The station, which is far beyond the continuous range of the species, is about 50 miles east of where Anderson collected it a century ago.

General Distribution: A plains and foothill species of the Cordillera that from southern California extends north through Alberta and British Columbia to Yukon and Alaska, north to Great Bear Lake, Bathurst Inlet, and Victoria Island; isolated in James Bay and E. Ontario.

EMPETRACEAE

Empetrum nigrum L.—Simmons, 1913, p.113.

Victoria Island: Noted as rare on trap rock at Holman Post, and in one place only. The specimens have bisexual flowers and, with most arctic N. American *Empetrum*, belong in the var. *hermaphroditum* (Lge.) Sør.

Because *Empetrum nigrum* everywhere is restricted to acid bogs and to non-calcareous soils, it is generally absent in most of the islands of the Archipelago, where it has not been recorded previously except in the easternmost parts, chiefly on Precambrian rocks. Simmons (1906) noted it as rare and local in Ellesmere Island and reported specimens from Hyperite Point in southern Axel Heiberg. I did not see it in central parts of that island.

General Distribution: Widespread circumpolar. In North America from Bering Strait to Greenland, in the eastern Arctic chiefly on Precambrian rocks north beyond lat. 80° N., south to northern New York and Maine, the Great Lakes, southern Alberta and British Columbia, with isolated stations in Long Island, New York, and N. California.

Epilobium arcticum Samuelss.

E. anagallidifolium, Simmons, 1913, p. 114, not Lam.

E. davuricum, Cody, 1953.

Banks Island: Russell Point, flowering specimens on August 13-20 on a wet lake shore, No. 17725. Victoria Island: Holman Post, Nos. 17318 and 17320; Minto Inlet, Anderson (*E. alpinum*, Kew!) head of Minto Inlet, No. 17412. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Rare or occasional in wet moss by lake shore and brooks, or in wet clay in frost-patterned tundra.

Epilobium arcticum is undoubtedly very closely related to *E. davuricum*, and Polunin (1938 and 1940) has reduced it to varietal status under that species. However, the more ample material of *E. arcticum* that is now available fully confirms that its seeds differ from those of *E. davuricum* by being perfectly smooth and distinctly obovoid-fusiform. This, together with its consistently smaller size, but above all, its high-arctic, amphi-Atlantic rather than circumpolar type of distribution, strongly suggests that *E. arcticum* should be maintained as a distinct species or at least as a geographical race. *E. arcticum*, as correctly stated by Samuelsson, l.c., is a truly arctic plant, whereas *E. davuricum* is a subarctic forest species that but rarely extends north of the tree-line. In Yukon it is decidedly a lowland species that was not observed above timberline (Porsild, 1951).

Distribution: Arctic North America, arctic western Europe, and Asia. In North America from Banks Island over Baffin Island to northern W. and E. Greenland, south to northern Hudson Bay region.

Epilobium latifolium L.

Chamaenerium latifolium, Simmons, 1913, p. 114.

Banks Island: De Salis Bay, Manning and Macpherson, No. 9; Nelson Head, *idem*, No. 100; Cape Lambton, No. 17591. Victoria Island: Wollaston Peninsula, C.A.E., No. 575; Holman Post, No. 17319; Minto Inlet and Cambridge Bay, Anderson (Kew!); noted at head of Minto Inlet; south coast, Rae (Kew!). King William Island: Larsen, No. 41. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Head of Mokka Fd.: No. 18712.

Occasional to common in sandy and gravelly places.

Distribution: Circumpolar arctic-alpine. In North America from Bering Strait to E. and W. Greenland, in Ellesmere Island north beyond lat. 83° N.; south to Newfoundland and Gaspe, and in the Rocky Mountains to lat. 38° N.

HIPPURIDACEAE

Hippuris vulgaris L.—Simmons, 1913, p. 115.

Banks Island: Noted as common in shallow ponds near the beach at Cape Lambton. Victoria Island: Noted at Holman Post; head of Prince Albert Sound, No. 17446; Cambridge Bay, No. 17471; *ibid.*, Anderson (Kew!).

Distribution: Widely ranging, circumpolar. North America from Bering Strait to E. and W. Greenland. In the eastern Canadian Arctic north to lat. 73° N., in Greenland north beyond lat. 76° N.

PYROLACEAE

Pyrola grandiflora Rad.

Banks Island: Noted on south-facing cliffs at Cape Lambton. Victoria Island: Holman Post, No. 17322; noted at head of Prince Albert Sound and at Washburn Lake.

Uncommon in Banks and Victoria islands where it is always restricted to most favoured habitats on the trap-sedimentary series.

Distribution: Circumpolar arctic. In North America from Bering Strait to W. and E. Greenland, in W. Greenland and Ellesmere north beyond lat. 77° N., south through Ungava to mountains of Newfoundland, Gaspe, James Bay, northern Ontario, Manitoba, and Alberta; isolated in the Rockies south to Banff Park.

Pyrola secunda L. var. **obtusata** Turcz.

Victoria Island: Holman Post, Nos. 17323-5.

Our specimens flowered on August 8 and the previous year had matured fruits. The collection represents a notable northward extension of the known range of this species, not previously recorded from the Arctic Archipelago.

Distribution: Subarctic, E. Siberia and N. America. In N. America from Bering Strait across to Labrador, Newfoundland, W. Greenland, north to the Arctic Coast, east of the Mackenzie Delta, Chesterfield Inlet and northern Labrador, south to Gaspe, Lake Superior, and Banff Park. In W. Greenland between lat. 64°–69° 15′ N.

ERICACEAE

Ledum decumbens (Ait.) Lodd ex. Steud.

Victoria Island: Noted as rare and only seen at Holman Post where it flowered on August 8.

Distribution: Subarctic E. Asia and N. America. In N. America from Bering Strait to W. Greenland, north to lat. 74° south to Ungava-Labrador, northern Hudson Bay region. Absent in E. Greenland, and in the Canadian Rockies south of lat. 60°, and in Europe and W. Asia.

Rhododendron lapponicum (L.) Wahlenb.—Macoun & Holm, 1921, p. 18.

Banks Island: Cape Lambton, very sparse, No. 17594. Victoria Island: Wollaston Peninsula, C.A.E., No. 579; rare or occasional in dry tundra near Holman Post, No. 17326.

Rhododendron lapponicum apparently is rare in Banks and Victoria islands, where it is restricted to the trap-sedimentary series. At Holman Post it had flowers and immature fruits on August 8; last year's capsules remained unopened.

Distribution: Circumpolar arctic. In N. America from Bering Strait to W. and E. Greenland, north to the Arctic Coast and southern Banks and Victoria islands, but in the Eastern Arctic to North Devon and to lat. 79° in N.W. Greenland; south to Newfoundland and Gaspe, James Bay, Churchill, and Great Slave Lake. Isolated stations in mountains of northern British Columbia.

Cassiope tetragona (L.) D. Don.—Simmons, 1913, p. 117; Macoun & Holm, 1921, p. 18.

Banks Island: Noted at Cape Lambton; Storkerson Bay, Manning and Macpherson, No. 137; Ballast Beach, Miertsch. (Kew!); Baring Land, M'Clure (Kew!). Victoria Island: Wollaston Peninsula, C.A.E., No. 577; Holman Post, No. 17321; Minto Inlet, Anderson (Kew!); noted at head of Minto Inlet and near Washburn Lake. Melville Island (acc. to Simmons, l.c.). King William Island: 5th Thule Exp., No. 1281; *ibid.*, Larsen, No. 42. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Head of Mokka Fd., Nos. 18714 and 18734.

Common only on soils derived from the trap-sedimentary series and always in closed vegetation where a thickness of humus has accumulated and where snow cover is assured during the winter.

Distribution: Circumpolar, arctic. In N. America from Bering Strait to E. and W. Greenland (except southernmost part), in Greenland and Ellesmere Island north beyond lat. 83° N.; south to northern Labrador-Ungava, northern Hudson Bay region, Keewatin, and Mackenzie. In S.E. Yukon and the Canadian Rockies the well-marked ssp. *saximontana* (Small) Porsild.

Arctostaphylos alpina (L.) Spreng.—Simmons, 1913, p. 118.

Banks Island: 15 miles up Sachs River, Manning and Macpherson, No. 6. Noted at 1,800 feet elevation near summit of Nelson Head, and at Cape Lambton; Ballast Beach, Miertsch. (Kew!); Baring Land, M'Clure (Kew!); Nelson Head, cliffs on foreland, No. 17784. Victoria Island: Noted at Holman Post; Minto Inlet, Anderson, (Kew!); Prince Albert Sound, Miertsch. (Kew!); head of Minto Inlet, No. 17413; south coast, Rae (Kew!).

A pronounced oxylophyte, noted as rather uncommon and found mainly on the trap-sedimentary series and only in sheltered places where a thickness of humus has accumulated. Although our Minto Inlet

specimens flowered on August 3, the species generally appeared to be sterile and probably does not mature fruits in Banks and Victoria islands, except in exceptionally favourable years.

Distribution: Circumpolar, subarctic-alpine. In N. America from Bering Strait, across Alaska, Yukon, Mackenzie, and Keewatin to southern Baffin Island and Labrador, in the west; north to the Arctic Coast and southernmost islands, in Baffin Island to 66° 30′[1]; south to Newfoundland, the Gulf of St. Lawrence, and James Bay, but apparently lacking in the Cordillera south of lat. 60°. Isolated in Greenland between lat. 64°–70° on the west coast, and between 68°–74° 33′ on the east coast.

Arctostaphylos rubra (Rehd. & Wils.) Fern.

A. alpina, Macoun & Holm, 1921, p. 18, not *A. alpina* (L.) Spreng.

Victoria Island: Wollaston Peninsula, C.A.E., No. 576.

Distribution: A pronounced calcicole of distribution similar to *A. alpina*, but less arctic than it. In the western islands known only from a single station in Victoria Island; in the eastern islands from isolated stations on Southampton Island and from the west coast of Baffin Island. Apparently absent in northern Labrador-Ungava and Greenland but in the Cordillera extending far south in the Canadian Rocky Mountains.

Vaccinium uliginosum L. var. **alpinum** Bigel.

V. uliginosum, Simmons, 1913, p. 118.

Banks Island: Cape Lambton, No. 17595. Victoria Island: Holman Post, No. 17327; Minto Inlet, Anderson (Kew!); noted at head of Minto Inlet; south coast, Rae (Kew!).

Like all other members of the *Ericaceae*, *Vaccinium uliginosum* is rare and local in Banks and Victoria islands, where it is restricted mainly to the area of trap-sedimentary rocks. It grows in such areas only in sheltered places where sufficient humus has accumulated. Although young fruits were noted on August 8 at Holman Post, the species probably does not mature fruits except in the most favourable seasons.

Distribution: Circumpolar-arctic. In N. America chiefly north of the tree-line from Bering Strait east to W. and E. Greenland. In Ellesmere north to lat. 80° N., south to Gaspe, James Bay, Keewatin, and Great Bear Lake. Apparently absent or rare in the mountains of Alaska-Yukon and in the Canadian Rockies.

Vaccinium Vitis-idaea L. var. **minus** Lodd.

Victoria Island: Walker Bay, H. Larsen (verbal report).

This species was noted by Superintendent Henry Larsen of the R.C.M.P. when wintering at Walker Bay in the *St. Roch*, in 1946. In the Archipelago otherwise known only from southern Baffin Island and from islands in northern Hudson Bay.

[1] By Hultén (1948) erroneously reported from S. Ellesmereland.

Distribution: Arctic and subarctic, almost circumpolar. In N. America from Bering Strait to Labrador and W. Greenland, north to the shores of the Arctic Ocean, in Baffin Island to lat. 66° 30′; south across the Continent to the southern limit of the boreal forest. In W. Greenland to lat. 69° 15′.

PRIMULACEAE

Primula stricta Hornem.—Simmons, 1913, p. 119.

P. borealis, Simmons, 1913, p. 119, not Duby.

Banks Island: Ballast Beach, Miertsch.; Baring Land, Anderson (acc. to Simmons). Victoria Island: Read Island, No. 17209; noted at Holman Post.

A pronounced calciphile, apparently rare and local, growing in moist sheltered places at or near the sea shore. Our specimens flowered on July 27 and had matured fruits the previous season.

Simmons, l.c., reported two collections of *P. borealis* from Banks Island, both in Kew under *P. Hornemanniana* Lehm., which, however, according to Fernald (1928, p. 66) is a straight synonym for *P. stricta* Hornem. Judging from two specimens in the National Herbarium of Canada, collected by Richardson during the Franklin Expedition, at least part of the material treated under *P. Hornemanniana* by Hooker (1838) likewise is *P. stricta*. Without having seen the actual specimens, the presence of *P. borealis* in Banks Island cannot be denied, but on phyto-geographical grounds alone it is unlikely[1]. *P. borealis* appears to be a littoral species, which from E. Asia extends along the shores of Bering Sea and northern Alaska to Cape Dalhousie east of the Mackenzie Delta. A large number of other Beringian radiants follow a similar pattern, but comparatively few have reached the Arctic Archipelago. *P. stricta* Hornem., on the other hand, is an amphi-Atlantic type, which over E. and W. Greenland extends west across arctic and boreal N. America to the Mackenzie but barely enters Yukon and Alaska. Thus far it has not been reported from elsewhere in the Archipelago but may be expected to occur on the Palaeozoic parts of western Baffin Island, and perhaps elsewhere in the Archipelago.

Androsace Chamaejasme Host. var. **arctica** Knuth.

A. Chamaejasme, Simmons, 1913, p. 120.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 20 and 64; Cape Lambton, No. 17592; Sachs Harbour, No. 17527; Ballast Beach, M'Clure (Kew!). Victoria Island: Read Island, No. 17207; Wollaston

[1] During my brief visit to Kew in 1950, time did not permit of the checking of all plants cited by Simmons (1913) from the Arctic Archipelago. During a more prolonged visit in 1954–55, I found that his report of *Primula borealis* from Ballast Beach, Miertsching, cannot be verified because the sheet on which it is mounted contains no less than five collections, representing *P. mistassinica*, *P. borealis*, and *P. stricta*. Obviously a mix-up of labels has occurred. On the upper half of the sheet are 10 vigorous specimens of *P. mistassinica* arranged around the Miertsching label. *P. mistassinica*, however, is not arctic, and the label, which in the mounting has been misplaced, is most likely one marked "Between Fort Simpson and Great Slave Lake. Capt. Pullen, July, 1850". It is impossible to decide now whether the plant Miertsching collected at Ballast Beach was *P. borealis* or *P. stricta*. Most likely it was the latter, represented on the sheet by two collections, to which are now affixed Miertsching and Capt. M'Clure labels, referring to places on the mainland coast.

Peninsula, C.A.E.; noted at Holman Post, at the head of Minto Inlet and at Cambridge Bay; Minto Inlet, Anderson (Kew!); south coast, Rae (Kew!).

A pronounced calcicole that is common or even ubiquitous on barren, rocky or gravelly places where the species flowered abundantly.

Distribution: Asia and arctic N.W. America from Bering Strait eastward to Coronation Gulf, north to Banks and Victoria islands, south to Great Bear Lake, and to mountains of northern Mackenzie, Yukon, and Alaska.

Androsace septentrionalis L.—Simmons, 1913, p. 120.

Banks Island: Noted at Cape Lambton. Victoria Island: Read Island, No. 17208; noted at Holman Post; Minto Inlet and Cambridge Bay, Anderson (Kew!); head of Minto Inlet, fruiting specimens on August 2–3, No. 17414. King William Island: Larsen, No. 43. Axel Heiberg Island: Diana Lake, head of Mokka Fd., No. 18713.

A pronounced calciphile that is occasional to common in calcareous clay, in gravelly places above the beach, and in similar places.

Distribution: The N. America population of *A. septentrionalis* is composed of several rather variable and poorly differentiated races, which as yet are not too well understood. The range of the arctic plant, which is variable chiefly as to size and number and length of pedicels, is more or less continous through Alaska, Yukon, Mackenzie, and Keewatin to the west coast of Hudson and James bays, less common in the southernmost islands and the east coast of James and Hudson bays. Isolated and disjunct stations in northern Baffin, Axel Heiberg, lat. 80° N., and Ellesmere islands, and at Etah in N.W. Greenland.

PLUMBAGINACEAE

Armeria maritima (Mill.) Willd. ssp. **labradorica** (Wallr.) Hult.

A. maritima, var. *sibirica*, Lawrence, 1947. Cody, 1953.

A. maritima, var. *labradorica*, Lawrence, 1947.

Statice maritima, Simmons, 1913, p. 120.

S. armeria, Simmons, 1913, p. 120.

(Map, fig. 22)

Banks Island: De Salis Bay, tundra flat, No. 17632; *ibid.*, in wet tundra, No. 17633; *ibid.*, Manning and Macpherson, Nos. 18 and 63; west coast, probably Sachs Harbour, Josephine Robertson, No. 79. Victoria Island: Wollaston Peninsula, C.A.E., No. 578; head of Minto Inlet, strandflat near mouth of river, No. 17404; Richard Collinson Inlet, Jenness, No. 12. King William Island: Larsen, No. 44. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Axel Heiberg Island: Flood plains at head of Diana Lake, No. 18715.

Occasional to common in tundra.

The notorious lack of good morphological characters in the genus *Armeria* is reflected in the difficulties encountered by its various monographers in their endeavour to establish easily recognizable subsections, species, or taxa below the species level. This difficulty was less evident to early students of the New World thrifts, who had at their disposal relatively few specimens from widely separated stations. Nevertheless, this difficulty has been manifold, intensified by the wealth of material now available, and shows that individual races, where their ranges overlap, tend to pass insensibly from one to another, and also that each race varies very considerably in stature and in the diameter of its heads according to habitat and climatic conditions. Thus, in the interior of Mackenzie District ssp. *labradorica* occasionally becomes 35 cm. tall or more (Compare Lawrence, 1947, p. 768), Great Bear Lake, Porsild, No. 5181; whereas in the Far North its scapes are frequently only 2 to 3 cm. high, Banks Island, Porsild, No. 17632.

Although their several monographers have not been in complete agreement as regards the nomenclature or taxonomic delimitation, it is pretty generally agreed, nevertheless, that the North American thrifts are best considered geographical races of the polymorphic *Armeria maritima* (Mill.) Willd. (Lawrence, 1940). In his comprehensive treatment, Lawrence (1947) recognizes six races of *A. maritima* in North America, of which four enter the Arctic. Of these, his var. *typica* reaches the southern tip of Greenland, but not America; var. *sibirica* is considered circumpolar; var. *labradorica* endemic to the eastern Canadian Arctic, where its range overlaps that of var. *sibirica*; and finally var. *purpurea* is believed to be endemic to the Bering Sea region, where its range overlaps that of the circumpolar var. *sibirica*, on one hand, and that of the non-arctic Pacific Coast race var. *californica*, on the other. In separating the races of *A. maritima*, Lawrence relies chiefly on the shape and length of the outer and inner involucral bracts, and only to a lesser extent on the pubescence of the calyx tube. The latter character, first noted by Wallroth (1844), was the basis for Boissert's (1848) subdivision of the genus into subsection *Holotrichae*, in which the ribs of the calyx tube as well as the intercostal space are densely hirsute, as opposed to subsection *Pleurotrichae*, in which only the ribs are pubescent. Though some students of *Armeria* have questioned the value of this character, most, including Druce (1901), Blake (1917), Malte (1934), and Hultén (1948), have found it quite reliable, at least in dealing with the arctic races. While, admittedly, an examination of a large number of specimens in any population of North American *Armeria maritima* will show that the pubescence of the calyx tube is subject to certain variations, such variations, within each race, are largely a matter of age. Thus, even in the typically holotrichous Labrador plant, the calyces of immature heads may be totally glabrous, whereas in mature ones the intercostal spaces become completely obscured by the converging pubescence on the ribs and cross-ribs. With proper allowance for age, the writer, in the field as well as in the herbarium, has found the pubescence of the calyx tube a rather more reliable character than the shape and length of the inner and outer involucral bracts by which Lawrence separates var. *sibirica* from var. *labradorica*. The writer must confess to his nability to see any consistent differences by which to separate these

two, believing that only two major races of *Armeria maritima* occur in the North American Arctic proper and that the eastern should be called *A. maritima* ssp. *labradorica* (Wallr.) Hult. Judging from its American distribution (*see* map, fig. No. 22, based on 175 specimens of arctic North American *Armeria maritima* in the National Herbarium of Canada), the latter is not, as has been assumed, a truly circumpolar race, but rather closely follows the distributional pattern of amphi-Atlantic species that in North America become progressively less common west of Hudson Bay and find their western limit somewhere around Great Bear Lake and in the westernmost islands of the Arctic Archipelago.

The other arctic race, ssp. *arctica* (Cham.) Hult., from eastern Asia, extends along the sea-coast of Alaska from the Kodiak Islands to Cape Dalhousie east of the Mackenzie Delta and thus follows the distribution pattern of other Beringian radiants. In the area where the two races meet, a plant is found that in some of its characters is intermediate between the two. Its fruiting calyx approaches the pleurotrichous type, and its basal leaves may occasionally be ciliate, as in ssp. *arctica*. Its ecology, on the other hand, definitely is that of ssp. *labradorica*, to which race it undoubtedly is most closely related. This plant thus far is known from a few collections from northwest Alaska, cited by Lawrence (l.c.) and Hultén (l.c.) as "intermediate", and from about a dozen collections from upland tundra east of the Mackenzie Delta and from the Great Bear Lake region; it has been collected also a few times in alpine tundra in the Mackenzie Mountains between lat. 62° and 64°, where it was erroneously reported as ssp. *arctica* by the writer (Porsild, 1945, 1951), and as *A. maritima* var. *purpurea* (Koch) Lawrence, by Raup (1947). It is interesting to note that the *Armeria* recently reported from Hoosier Pass, Park County, Colorado (Lawrence, 1947), likewise appears to belong to ssp. *labradorica*; whereas the curiously isolated plant described by Raup (1936), from Lake Athabasca[1], is something else again, differing from all other N. American *Armeria* by its totally glabrous calyx tube.

As noted above, the ecology of the arctic races of *A. maritima* is quite distinct. In Greenland and in Scandinavia it has long been known that *A. maritima* s. str. and its var. *elongata* are strictly littoral; whereas ssp. *labradorica* (Wallr.) Hult. is a tundra plant which is in no sense littoral, although it often grows near sea-level. That this is the case also in North America is implied by Iversen (1940), but as far as the present writer is aware, this has not been specifically noted by American students of *Armeria*, although the fact that ssp. *labradorica* is not restricted to sea-shore stations is evident from a few citations of herbarium labels (Blake, 1918).

The western ssp. *arctica*, on the other hand, is definitely littoral or, at least in the writer's experience, limited to sea-shore tundra subject to flooding by the sea, and to bird cliffs near the sea-coast. It has not been reported from the interior of Alaska or Yukon, where thus far no *Armeria* is known to occur, a fact that strongly supports the writer's contention that ssp. *labradorica* is an eastern amphi-Atlantic type.

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[1] *Armeria maritima* L. ssp. *interior* (Raup) n. comb.
A. *interior* Raup in Jour. Arnold Arb. 27:289 (1936).

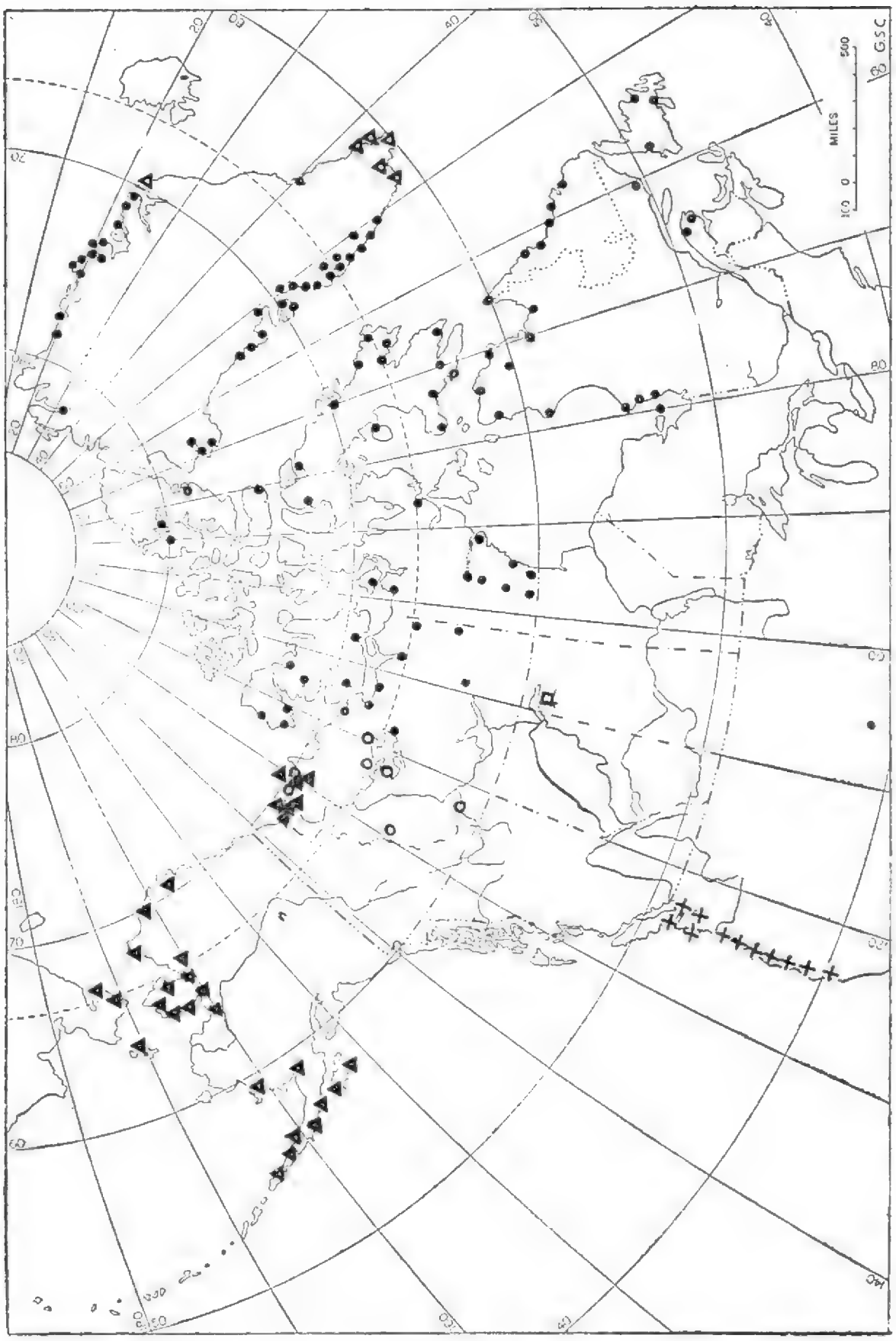

Figure 22. Ranges of North American races of *Armeria maritima* (Mill.) Willd.: ssp. *labradorica* (Wallr.) Hult., solid circles; ssp. *arctica* (Cham.) Hult., solid triangles; ssp. *labradorica* approaching ssp. *arctica*, open circles; ssp. *interior* (Raup) n. comb., open squares, ssp. *californica* n. comb., crosses; ssp. *typica*, open triangles.

The Pacific Coast race of *Armeria maritima*[1] likewise is littoral. It is a much coarser plant than ssp. *arctica*, and in general appearance, as well as in its well-developed and prominently exserted corolla, greatly resembles the littoral *A. maritima* and its var. *elongata* of northern Europe. It is of interest to note here that Iversen (l.c.) takes an independent view of the taxonomic position of the Californian thrift, which he considers a race of the South American *A. macloviana*, and that *A. sibirica* Turcz. and *A. arctica* (Cham.) Wallr., in Fl. U.S.S.R. vol. 18 (1952), are treated as distinct species. The distribution of the first is given as E. Siberia, Angara-Sajan, Mongolia, and that of *A. arctica* is said to be Arctic Eur., Novaya Zemlya, arct. Siberia, Chukotsk, Anadyr, Kamch., Okhotsk, Sakhalin Beringia and arct. America. This of course is contrary to the conclusions of recent monographers and authors, who agree that the arctic European and eastern arctic American plant is *A. sibirica* (*A. maritima* ssp. *labradorica*).

GENTIANACEAE

Gentiana arctophila Griseb.

Banks Island: Cape Lambton, moist, grassy slope below bird cliff, No. 17593; Nelson Head, Manning and Macpherson, No. 112. Victoria Island: Holman Post, Nos. 17328 and 17415.

Occasional to rare, and perhaps restricted to south-facing, protected slopes. Our specimens were well developed and flowered from July 28. New to the flora of the Archipelago.

Distribution: A Cordilleran species that extends north from the Canadian Rocky Mountains through the Mackenzie Mountains to the Arctic Coast and western islands of the Archipelago, east to Great Bear Lake, westward into Yukon. Records from Alaska need confirmation.

Lomatogonium rotatum (L.) Fr.

Victoria Island: Holman Post, flowering specimens on August 8, on a gravelly beach above the high-tide mark, No. 17329. New to the flora of the Archipelago.

Distribution: Circumboreal. In North America from Alaska to Labrador, north to the Arctic Ocean and southern west and east shores of Hudson and James bays, southern half of west Greenland, south to Newfoundland and the Gulf of St. Lawrence and Maine. In the western interior plains and foothills, from central Alaska and Yukon south through the interior Rocky Mountain region to Colorado, the rather distinct race, ssp. *tenuifolium* (Griseb.) n. comb. (*Pleurogyne rotata*, var. *tenuifolia* Griseb. in Gen. et Sp. Gent. 309, 1839), which, besides being non-littoral, differs from *L. rotatum* by its taller and more fastigate growth, its narrower leaves and calyx lobes, and its smaller flowers.

[1] *Armeria maritima* L. ssp. *californica* (Boiss.) n. comb.
A. andina Poepp. ex Boiss. var. *californica* Boiss. in DC. Prod. 12:682 (1848).

POLEMONIACEAE

Polemonium boreale Adams.—Simmons, 1913, p. 121.

Banks Island: De Salis Bay, Manning and Macpherson, No. 61; Nelson Head, No. 17785; *ibid.*, Manning and Macpherson, No. 82; Masik Valley, *idem*, No. 2; Cape Lambton, grassy places below a sea-gull cliff, No. 17597; west coast, August 8, 1940, Josephine Robertson, CAN, No.116; Mercy Bay and Ballast Beach, Miertsch. (Kew!); Baring Land, M'Clure (Kew!); Mercy Bay, Manning and Sparrow, No. 221; Castel Bay, Manning and Sparrow, Nos. 183-4. Melville Island: ex Herb. Trevelyan [a fragment probably collected by M'Clintock] (Kew!).

Distribution: Circumpolar arctic-alpine. In N. America from Alaska east to the Mackenzie Mountains, north to the Arctic Coast, with a large gap between Banks Island and central northeast Greenland.

Phlox Richardsonii Hook.—Simmons, 1913, p. 121.

Banks Island: Sachs Harbour, in dry, sandy tundra, No. 17528; Ballast Beach, Miertsch. (Kew!).

Our specimens formed rather compact, hemispherical cushions that on July 30 were covered by the fully expanded and very fragrant flowers. The limbs of the expanded corollas were 1·3 cm. in diameter, pale lavender to pale blue or almost pure white. The tube of the corolla is much longer than that of the calyx. Hultén (1948, p. 1318) stated that "*Ph. Hoodii* differs from *Ph. Richardsonii* . . . in having the tube of the corolla much longer than the calyx". The reverse is actually the case as a glance at Hooker's fine plate, or at the description, will at once show (Hooker, 1834, p. 74, tab. 160). Brand. (Pflanzenr. IV, 250, p. 85) also confirms this by saying of *Ph. Richardsonii* "corolla pulchre lilacina, tubo calyce sesquilongiore. . . ."

Distribution: Alaska, Yukon, and Mackenzie. A rare endemic of Arctic N.W. America, the type of which came from Cape Bathurst on the Arctic Coast east of Mackenzie Delta. Besides the Banks Island specimens listed, the writer has seen the following specimens:

Alaska: Sadlerochit R., C.A.E., No. 17 (CAN); Cape Mulgrave, Capt. Beechey (GH). Yukon: Mayo District, Hugh Bostock, No. 223 (as *Ph. Hoodii* by Porsild, 1951); Selkirk Trail near Aishihik, J. B. Tyrrell, CAN, No. 19443 (by Hultén, l.c., as *Ph. Hoodii*). Mackenzie District: Cape Bathurst, Pullen (GH marked isotype); shores of Arctic Sea, 1862, R. T. Macfarlane (GH); Cape Bathurst, C.A.E., No. 516 (CAN, GH); Clifton Point; Dolphin and Union Strait, C.A.E., No. 686 (CAN).

BORAGINACEAE

Mertensia Drummondii (Lehm.) G. Don.—Macoun & Holm, 1921, p. 19; Williams, Ann. Mo. Bot. Gard. 27 : 263 (1940), tab. 30.

Victoria Island: Wollaston Peninsula, C.A.E., No. 410. In addition known only from Clifton Point, Dolphin and Union Strait, C.A.E., No. 687 and from the type collection: "Arctic Sea-Shore—Dr. Richardson" (Kew!). The exact type locality is not known but may well be Dolphin and Union Strait.

According to Williams, l.c., this curious species is most closely allied to *M. viridis* A. Nels., which belongs in a group whose centre of distribution is in Colorado, more than 1,500 miles to the south.

Mertensia maritima (L.) S. F. Gray—Simmons, 1913, p. 122.

Banks Island: Cape Lambton, No. 17596. Victoria Island: Head of Minto Inlet, No. 17416; south coast, Rae (Kew!). Noted at Holman Post and Cambridge Bay.

Perhaps limited to sandy beaches of the southern parts of the islands.

Distribution: Circumpolar, littoral. In N. America its range is continuous along the sea shore from northern British Columbia over Alaska and along the Arctic Coast of the mainland east to Labrador, south to Massachusetts. In the eastern Archipelago it extends north to N. Devon Island, in west Greenland to lat. 78° N. but with only a few stations in the southern half of the east coast.

SCROPHULARIACEAE

Castilleja pallida (L.) Spreng. ssp. **elegans** (Ostenf.) Penn.

C. pallida var. *septentrionalis*, Simmons, 1913, p. 122, not Lindl.

C. pallida, Macoun & Holm, 1921, p. 19.

Banks Island: De Salis Bay, No. 17636; *ibid.*, Manning and Macpherson, No. 62; Nelson Head, No. 17786 (f. *albiflora*); *ibid.*, Manning and Macpherson, No. 87; Baring Land, M'Clure (Kew!); Cape Lambton, No. 17598. Victoria Island: Wollaston Peninsula, C.A.E., No. 3248; noted at Holman Post, head of Minto Inlet and Cambridge Bay; Minto Inlet and Cambridge Bay, Anderson (Kew!).

Occasional to common, but never abundant, in open vegetation on south-facing and sheltered slopes.

As noted by Hultén (1949, p. 1392) "the study of herbarium specimens of the *Castillejas* is very difficult". This is especially true of the races of *C. pallida* as outlined by Pennell, who (1934, p. 524) under ssp. *caudata*, when giving the range of that race, noted that "On the borders of this area [it] passes freely into other sub-species of *C. pallida*: on the southwestern coast to subsp. *typica*; on the coast of Seward Peninsula to subsp. *elegans*; on the southern side of the upper Yukon to subsp. *mexia*; and about the northernmost bend of the Yukon River to subsp. *auricoma*". In the writer's experience (Porsild, 1943) ssp. *caudata* seems a fairly clear-cut race, which is endemic to Alaska and Yukon, reaching east to the Mackenzie Delta. The race found in Banks and Victoria islands, however, is not ssp. *caudata* but ssp. *elegans*, the type of which came from Tree River on the south coast of Coronation Gulf (CAN, No. 98,899). The range assigned to it by Pennell is "meadows, moist shores, and tundras, along the Arctic Coast from Bering Strait to Hudson Bay; south of Bering Strait, occurring on the northern shore of Norton Sound, and in Hudson Bay on the western shore south to Churchill, Manitoba; extending inland through the Northwest Territories from the Mackenzie Delta to the northwestern shore of Hudson Bay. . . . Probably this subspecies also extends

westward from Bering Strait along the Arctic Coast of Siberia." Using Pennell's key and descriptions, the writer (Porsild, 1943) experienced some difficulty in separating ssp. *elegans* from ssp. *typica*. The latter, according to Pennell, is a Siberian plant, which has barely reached the American side of Bering Strait where "it passes into *C. p. caudata*". The writer has seen no typical ssp. *elegans* from Alaska and strongly suspects that, when better understood, this race will be found to be endemic to the central Canadian Arctic, with a range extending from the Mackenzie Delta to the west shore of Hudson Bay, south to the limit of trees, north to Banks and Victoria islands.

Pedicularis arctica R. Br.—Simmons, 1913, p. 123.
P. Langsdorffii, Cody, 1953.

Banks Island: De Salis Bay, No. 17637; Sachs Harbour, No. 17529; Cape Crozier, Manning and Macpherson, No. 168; Mercy Bay, Miertsch. (Kew!); Russell Point, No. 17726. Victoria Island: Noted at Read Island; Holman Post, No. 17330; noted at head of Minto Inlet, Prince Albert Sound and Cambridge Bay; Minto Inlet and Cambridge Bay, Anderson (Kew!); south coast, Rae (Kew!). Melville Island: McMillan, CAN, No. 77299 (Type locality). King William Island: Recorded by 5th Thule Exp. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Common everywhere in wet tundra where the species flowered from end of July.

Although Hultén (1949, p. 1411) is undoubtedly correct that no distinct line of demarcation can be found between *P. Langsdorffii* and *P. arctica*, those who have had field experience with both (Porsild, 1943), or with the latter (Simmons, 1906; Polunin, 1940, and Porsild, 1943, 1951) agree that *P. arctica* is more than a mere climatic "modification" of *P. Langsdorffii*, and that in the eastern part of its range it approaches *P. hirsuta* as much as it does *P. Langsdorffii* in the west. In fact, specimens of otherwise typical *P. hirsuta* in which the galea is bidentata are not uncommon in the northeastern Canadian Arctic and have been seen from N.W. Greenland and even in arctic Scandinavia (Porsild, 1943). Also, on phytogeographical grounds it would seem best to consider *P. arctica* distinct and belonging to the group of endemics of the Central Canadian Arctic, because the range of so few Beringian radiants extends east of the Mackenzie River and because the plant found in isolated and high mountains of Yukon and in the southern Canadian Rocky Mountains clearly is the arctic plant rather than *P. Langsdorffii*.

Distribution: Arctic-alpine. From the north slope of Brooks Range, Alaska, along arctic coast of Mackenzie District, across the Arctic Archipelago to N.W. Greenland, southward through mountains of Yukon to high peaks of the Canadian Rocky Mountains south to lat. 50° N.

Pedicularis capitata Adams.—Simmons, 1913, p. 125; Macoun & Holm, 1921, p. 20.

Banks Island: De Salis Bay, No. 17638; *ibid.*, Manning and Macpherson, No. 47; Cape Lambton, *idem*, No. 88. Victoria Island: Wollaston Peninsula, C.A.E., No. 307B; Holman Post, No. 17331; Minto Inlet and

Cambridge Bay, Anderson (Kew!); noted at head of Minto Inlet, Prince Albert Sound and Tahoe Lake; Cambridge Bay, Fortier, No. 11, and Anderson (Kew!). King William Island: Larsen, No. 45; Fortier, No. 81. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville Island (acc. to Simmons, l.c.). Axel Heiberg Island: Head of Mokka Fd., No. 18716; Hyperite Point (acc. to Simmons, l.c.).

Commonly growing in turfy places where snow accumulates in winter; flowering in Banks Island from the end of July.

Distribution: E. Asia, and arctic and alpine N. America. From Bering Sea and the N. Pacific Coast of Alaska across Yukon and northern Mackenzie, Keewatin, and the Archipelago to N.W. Greenland; in Ellesmere Island north to lat. 80°, south to northern Hudson Bay region and Great Bear Lake. Isolated in high mountains of the Canadian Cordillera, south to lat. 54° N.

Pedicularis hirsuta L.—Simmons, 1913, p. 123.

Melville Island (acc. to Simmons, l.c.). Axel Heiberg Island: Head of Mokka Fd., Nos. 18717–8; Hyperite Point (acc. to Simmons, l.c.).

Distribution: Amphi-Atlantic, arctic. N. America, E. and W. Greenland, north beyond lat. 83° N., west to Axel Heiberg and Melville islands, N. Somerset Island, Ogden Bay on the Arctic Coast, long. 101° 45′ and the northern west coast of Hudson Bay, south to lat. 60° in Keewatin and Ungava-Labrador.

Pedicularis lanata Cham. & Schlecht.—Simmons, 1913, p. 124; Macoun & Holm, 1921, p. 20.

Banks Island: De Salis Bay, Manning and Macpherson, No. 68; noted as common at Cape Lambton; Sachs Harbour, Manning and Sparrow, No. 246; noted at Russell Point; Mercy Bay, Miertsch. (Kew!). Victoria Island: Read Island, No. 17210; Wollaston Peninsula, C.A.E., No. 283B; Holman Post, No. 17332; Minto Inlet, Anderson (Kew!); noted at head of Minto Inlet, head of Prince Albert Sound and Cambridge Bay; Cambridge Bay, Fortier, No. 13; Greely Haven, Fortier, No. 92. King William Island: Fortier, No. 46. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Melville Island (acc. to Simmons, l.c.).

Common in closed tundra; flowering in Banks Island from end of July.

Distribution: Almost circumpolar, arctic-alpine. N. America from Alaska across to Davis Strait and northern parts of W. Greenland (lacking in E. Greenland), in Ellesmere Island north beyond lat. 81° N. South to lat. 66° 30′ in W. Greenland, in Labrador-Ungava and Northwest Territories to lat. 60°. Isolated on high mountains of Alberta and British Columbia.

Pedicularis sudetica Willd.—Simmons, 1913, p. 123.

Banks Island: De Salis Bay, No. 17639; *ibid.*, Manning and Macpherson, No. 49; noted at Cape Lambton; Sachs Harbour, No. 17530; Storkerson Bay, Manning and Macpherson, No. 138; Mercy Bay, Miertsch. (Kew!); Russell Point, No. 17727. Victoria Island: Noted as common at

Read Island, Holman Post, head of Minto Inlet, Prince Albert Sound, Tahoe Lake, and Cambridge Bay; Richard Collinson Inlet, Jenness, No. 13; Cambridge Bay, Fortier No. 20; Minto Inlet and Cambridge Bay, Anderson (Kew!). Melville Island: McMillan, CAN, No. 77301. King William Island: Larsen, No. 47. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.). Prince of Wales Island: Fortier, No. 67.

Noted as common in Banks and Victoria islands, in wet tundra, flowering from end of July.

Distribution: Arctic-alpine, almost circumpolar but in N. America a decidedly western species that becomes progressively less common as it approaches Davis Strait and is entirely lacking in Greenland and apparently also in Ungava-Labrador. North to Melville Island and N. Devon, south to James Bay and approximately to lat. 60° west of Hudson Bay. Isolated in mountains of Alberta and British Columbia.

PLANTAGINACEAE

Plantago septata Morris.

P. lanceolata var., Macoun & Holm, 1921, p. 20.

Banks Island: Nelson Head, No. 17787; Masik Valley, Manning and Macpherson, No. 4. Victoria Island: Noted at Holman Post on a dry slope; head of Minto Inlet, on stony summit and on ledges 500 feet high, No. 17418.

A non-littoral, calcicolous species growing on dry, sunny slopes. Flowering specimens from end of July.

Distribution: Alpine and subarctic N.W. America, ranging from Bathurst Inlet through Mackenzie, Yukon, and Alaska to about long. 150° W. Isolated in Rocky Mountains (Jasper Park and Montana). The type came from Yukon.

CAMPANULACEAE

Campanula uniflora L.—Simmons, 1913, p. 125.

Banks Island: Nelson Head, Manning and Macpherson, No. 93; on screes of trap-sedimentary rocks near Cape Lambton, No. 17599. Victoria Island: Walker Bay, No. 17498; Minto Inlet, Anderson (Kew!).

A decided oxylophyte, which in the western islands appears to be restricted to the acid trap-sedimentary series.

Distribution: Arctic-alpine, N. America, E. Asia, and Europe. The North American population of *C. uniflora* appears to be divided by the calcareous Palaeozoic rocks of Yukon and the Mackenzie lowlands into an eastern and western population: Arctic and alpine Alaska, apparently absent in Yukon but with widely disjunct stations on granite mountains in Richardson Mountains west of Mackenzie, and in the Rocky Mountains south to lat. 39°. From Banks and Victoria islands over Melville and Ellesmere islands to E. and W. Greenland, north to lat. 80°, south to Labrador-Ungava and the Hudson Bay region. Isolated in Gaspe.

Solidago multiradiata Ait.

Victoria Island: Noted as rare at Holman Post. In the Archipelago otherwise known only from a few collections in southernmost Baffin Island.

Distribution: *S. multiradiata, s. lat.*: E. Asia and N. America. From Alaska to Labrador-Ungava, north to the Arctic Coast at Mackenzie Delta, south to James Bay, Newfoundland, and Gaspe, and in the Rocky Mountains south to Colorado.

Aster pygmaeus Lindl. *See* Porsild in Nat. Mus. Canada Bull. 121: 298 (1951).

A. sibiricus, Macoun & Holm, 1921, p. 20, as regards plant of Victoria Island, not L.

Banks Island: De Salis Bay, Manning and Macpherson, No. 14. Victoria Island: Read Island, No. 17214; Wollaston Peninsula, C.A.E., No. 349a.

A rare and little known endemic thus far known only from a few collections from the Coronation Gulf region. Besides the collections cited by the writer (l.c.), new and better material has recently been collected in Bathurst Inlet, J. P. Kelsall and E. H. McEwen, No. 244.

Erigeron compositus Pursh—Simmons, 1913, p. 127; Macoun & Holm, 1921, p. 21.

Banks Island: De Salis Bay, Manning and Macpherson, No. 26; Nelson Head, No. 17788; *ibid.*, Manning and Macpherson, No. 104; Cape Lambton, No. 17604; Baring Land, M'Clure (Kew!); Prince of Wales Strait, south of Russell Point, No. 17771. Victoria Island: Holman Post, No. 17340; head of Minto Inlet, No. 17425; Wollaston Peninsula, according to Macoun & Holm, l.c.). Melville Island (acc. to Simmons). Axel Heiberg Island: Head of Mokka Fd., No. 18721.

Erigeron compositus is occasional to common in sandy and rocky places and is a pronounced calcicole, which, moreover, has a strong preference for well-drained sandy and gravelly soils. Its rather spotty distribution and its total absence within the region occupied by the Precambrian Shield undoubtedly is due to edaphic rather than to geographic or historic reasons.

Distribution: From mountains of Alaska over Yukon, Mackenzie, and the northern Archipelago to northern E. and W. Greenland, south in the Cordillera to South Dakota, Colorado, and California. In the East isolated in Gaspe and in southern E. and W. Greenland. Totally absent in the Precambrian Shield region. All specimens seen from within the arctic range of *E. compositus* belong in the poorly differentiated var. *discoides* A. Gray (*E. trifidus* Hook.), distinguished by ternate, only once divided leaves.

Erigeron eriocephalus J. Vahl.

E. uniflorus, Simmons, 1913, p. 126, pro max. pte.

Banks Island: De Salis Bay, No. 17640; Nelson Head, No. 17790; Cape Lambton, No. 17605; Storkerson Bay, Manning and Macpherson, No. 140; Bernard Island, No. 17761; Cape Crozier, Manning and Macpherson, No. 169; Castel Bay, Jenness, No. 58; *ibid.*, Manning and Sparrow, No. 186; Russell Point, Nos. 17729-30; Ballast Beach, Miertsch. (Kew!). Victoria Island: Noted at Holman Post and at the head of Minto Inlet; Minto Inlet, Anderson (Kew!). Prince Patrick Island: Mould Bay, MacDonald, Nos. 35 and 167. Melville Island: ex Herb. Trevelyan (Kew!). Axel Heiberg Island: Head of Mokka Fd., No. 18722.

Occasional to common in dry tundra and in clayey and gravelly places, sometimes growing in grassy places by brooks. The species is a decided calcicole.

Distribution: Arctic-alpine. Arctic Eurasia and N. America. From Alaska across to northern E. and W. Greenland, in Ellesmere Island north beyond lat. 80° N., south in Labrador-Ungava, Keewatin to about lat. 60° N.

Erigeron grandiflorus Hook.—Fl. Bor.-Am. 2:18 (1834).

(Plate XXII, figures 1-4)

Victoria Island: Holman Post, on dry, gravelly slope, with flowers and ripening achenes on August 8, 1949, Nos. 17341-2. New to the Arctic Archipelago.

Caespitose, with a rather stout, branching rootstock. Basal leaves entire, 5 to 6 cm. long; the entire, oblanceolate, 5 to 6 mm. wide, blade tapering into a distinct petiole, grey-villous on both sides and with a strong mid-vein. Flowering stems 1 to 5, simple, 12 to 16 cm. long, stout and stiffly erect, greenish-purple and villous, bearing 2 to 4 reduced, sessile leaves. Heads large, hemispherical, 2·5 to 3·5 cm. in diameter, 1·3 cm. high. Phyllaries of equal length, densely grey-villous, linear, attenuate, the glabrous and purplish-black tips somewhat spreading or reflexed; ligules linear to narrowly oblanceolate, acute, 2 mm. broad, pale lavender in life, sometimes drying pale yellow; pappus straw-coloured, achenes strigose. Calcareous slopes, dry tundra.

Erigeron grandiflorus was long known only from the type collection: "Summits of Rocky Mountains" [in approx. lat. 53° 30′ N., Alta.] where it was collected by Drummond during the Franklin Expeditions. In 1891 it was rediscovered near the type locality by John Macoun (summit of Saddle Mountain, Rocky Mountain Park, CAN, No. 7718), and in 1925 it was collected there by Malte and Watson, Nos. 1988 and 2008; in 1897 Macoun collected it in the Crowsnest Pass, CAN, No. 70348. Finally, in 1951, the author added a new station on the upper Red Deer River, not far from the type locality, Porsild, No. 18209. Two years after Macoun's rediscovery, *E. grandiflorus* was collected at the mouth of the Mackenzie River by Rev. J. C. Stringer; in 1899 it was first collected in central Yukon by M. W. Gorman, No. 1109 (CAN). More recently it has turned up elsewhere along the arctic coast of Yukon and Mackenzie from Herschel Island (Ostenf. 1909) to Cape Dalhousie and Anderson River (Porsild,

1943) and in McKinley Park, Alaska Range, and Alaska (Cronquist, 1947). The present collections from Victoria Island again considerably extend the known range of this rare plant.

A comparison of the specimens in the sixteen known collections of *E. grandiflorus* shows that it is composed of three rather distinct "races". Thus, the Rocky Mountain plant has the smallest flowering heads, averaging about 2·5 cm. in diameter, and is the least hirsute; its basal leaves are obovate-spatulate, 2 to 3 cm. long, and lack petioles. A duplicate of the type (GH) agrees completely with Hooker's description, whereas his Plate 123 (l.c.) suggests a monocephalous form of *E. caespitosus* rather than *E. grandiflorus.* At any rate the basal leaves shown in the plate are oblanceolate rather than obovate, and the phyllaries are shown to be of unequal length, in 2 or 3 series, their tips merely acute, lacking the long-acuminate and often reflexed tips, so characteristic in typical *E. grandiflorus.* The arctic population is rather uniform and differs from the Alberta population by its dense, grey, villous pubescence, by larger heads, and by longer distinctly petiolate leaves. The Alaska population finally is considerably taller than the others, with stems 20 to 25 cm. high, the heads up to 4 cm. in diameter, and the basal leaves up to 10 cm. long, with very distinct and narrow petioles.

E. grandiflorus Hook. is closely related on one hand to *E. Muirii* Gray of N.W. Alaska and Yukon, to *E. yukonensis* Rydb. of central Yukon, and to *E. hyperboreus* Greene (*E. alaskanus* Cronq.) of central Alaska and the Bering Strait district of Alaska, and on the other to *E. simplex* Greene of the southern Cordillera. The last-named differs mainly by being less hirsute and by its almost glabrous achenes, but it does not seem closely related to the up to 60 cm. tall, very leafy, and 1 to 4 pedunculate meadow species *E. elatior* (A. Gray) Greene, to which Cronquist (l.c.) compared it.

Erigeron unalaschkensis (DC) Vierh.

Banks Island: In a stream bed, Nelson Head, Manning and Macpherson, No. 83. Victoria Island: Wollaston Peninsula, C.A.E., No. 375.

In the Archipelago otherwise known only from southern Baffin Island.

Distribution: Circumboreal, subarctic-alpine. In N. America from Alaska across to northernUngava-Labrador, southern E. and W. Greenland, north to the Arctic Ocean, south to James Bay, and in the Rocky Mountains to Colorado.

Antennaria compacta Malte. *See* Porsild, Can. Field-Nat. 64:12 (1950), map tab. 1, fig. 8; *idem,* Nat. Mus. Canada Bull. 121:308 (1951), tab. 30, figs. 1-8.

A. alpina, Simmons, 1913, p. 127, not L.

Banks Island: Noted at De Salis Bay; Cape Lambton, No. 17600. Victoria Island: Holman Post, dry cliffs, Nos. 17333-5; Minto Inlet, Anderson (Kew!); head of Minto Inlet, dry slope, No. 17419; Walker Bay, No. 17499. Melville Island: Simmons, l.c., under *A. alpina,* cites a specimen in British Museum, collected by J. C. Ross. Axel Heiberg Island: Very rare on a diorite scree near the head of Mokka Fd., No. 18719.

Occasional to common on dry, sunny, and rocky slopes where the species forms small compact tussocks.

Distribution: A western arctic species known from a few stations in northern Alaska, from high mountains of Yukon and the Mackenzie Range east to Great Bear Lake, the Arctic Coast, and across the Arctic Islands to N.W. Greenland (Marshall Bay, Inglefield Land, Nygaard, July 2, 1921, Herb. Oslo).

Matricaria ambigua (Ledeb.) Kryl.

M. inodora, Simmons, 1913, p. 127.

Banks Island: Noted at Cape Lambton and at Russell Point. Victoria Island: Noted as common at Read Island, Holman Post, head of Minto Inlet, and at the head of Prince Albert Sound; Minto Inlet, Anderson (Kew!). King William Island: Larsen, No. 48; 5th Thule Exp., No. 1179. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

Occasional to common on moist sandy and gravelly beaches, where it is sometimes subjected to flooding. Less common in tundra, and never far from the sea shore.

Distribution: Probably circumpolar. In N. America an arctic widespread littoral species common along the sea shore from Bering Strait to northern Ungava, north to Banks and northern Baffin Island, south to James Bay. In Greenland known from a few widely separated stations on the east and west coasts.

Chrysanthemum integrifolium Richards.—Simmons, 1913, p. 128; Macoun & Holm, 1921, p. 21, fig. 12, 1.

Banks Island: De Salis Bay, Manning and Macpherson, No. 19; Cape Lambton, No. 17603; noted at Sachs Harbour and Russell Point; Storkerson Bay, Manning and Macpherson, No. 139; Mercy Bay, Manning and Sparrow, No. 223. Victoria Island: Noted at Read Island; Wollaston Peninsula; the head of Minto Inlet; Prince Albert Sound and Cambridge Bay; Holman Post, No. 17399; Minto Inlet and Cambridge Bay, Anderson (Kew!); Wollaston Peninsula, C.A.E., No. 317b. King William Island: Larsen, No. 49, and others. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.)

Throughout its range *Chrysanthemum integrifolium* is rather common in peaty depressions in calcareous and stony barrens where it is often associated with *Dryas integrifolia* and *Braya purpurascens*.

Distribution: Arctic E. Asia; arctic North America from Seward Peninsula, Alaska to Baffin Island; north across the southern islands to North Devon, south to Hudson Strait and northern Hudson Bay and Strait region, the arctic coast of Mackenzie and Keewatin to Great Bear Lake; south through the Mackenzie Mountains to high mountains of northern British Columbia.

Artemisia borealis Pall.

Victoria Island: Read Island, rare on gravelly beach, No. 17211; head of Minto Inlet, very sparse on rocky slope, No. 17423. In the Archipelago otherwise recorded only in south Baffin Island.

Apparently very rare and local.

Distribution: Arctic-subarctic, nearly circumpolar. In N. America from Alaska to central W. Greenland, north through Mackenzie and Keewatin to the Arctic Coast, south to Newfoundland, Gaspe, James Bay, and Lake Athabasca. Lacking in E. Greenland.

Artemisia hyperborea Rydb. in N. Am. Fl. 34,3 : 262 (1916).

A. borealis, Simmons, 1913, p. 128, as regards Anderson's plant from Minto Inlet.

(Plate XXIII, figures 1-3)

Victoria Island: Holman Post, on a sunny, gravelly slope, No. 17338; Minto Inlet, Dutilly, No. 18845, CAN (distributed as *A. Richardsoniana);* head of Minto Inlet, stony summit of hill, 500 feet above sea-level, No. 17421; Wollaston Peninsula, C.A.E., No. 337b. Otherwise known from the east branch of the Mackenzie Delta, Great Bear Lake, and Bernard Harbour on the south shore of Dolphin and Union Strait (type locality); apparently isolated in mountains of central Alaska (Healy, A. E. & R. P. Porsild, No. 374).

A rare and little known plant, of which Rydberg had only young and rather poor material. Holm's drawing (Macoun & Holm, 1921, tab. 13, figs. 2 and 4) is based on the same material but inaccurately shows the leaf segments as cuneate tridentate rather than deeply divided 3 to 5 pinnatifid, as correctly described by Rydberg. The flowering stem is shown as covered by long villose pubescence, although Rydberg correctly described it as "finely white tomentose". The following description is based on the more abundant and better material now available.

Caespitose with numerous sterile rosettes from a subligneous, multicipital caudex. Leaves strongly aromatic, about 3 cm. long, twice pinnate, finely silvery tomentose, the blade about 1 to 1·5 cm. long, the ultimate divisions flat and obtuse. Flowering stems 10 to 20 cm. high, simple, thinly appressed tomentulose, bearing from 2 to 4 reduced leaves; inflorescence racemose, at first capitate but soon elongating, becoming 6 to 8 cm. long, with from 15 to 20 erect heads on 3 to 5 mm. long, woolly peduncles, each supported by a leafy bract. Heads about 5 mm. broad and 4 mm. high; phyllaries broadly oval with a woolly, greyish-green centre and a broad, dark brown scarious margin; the disc flowers are fertile, the corollas bright yellow, and the receptalum naked.

A rather attractive species growing on dry, sunny slopes.

Hultén (Fl. Alas. and Yukon, p. 1576) compares *A. hyperborea*, of which he has seen the type, with *A. trifurcata* var. *heterophylla* (Bess.) Kudo, concluding that "it seems to differ from *A. trifurcata* merely in the lobes of the leaves being more obtuse," and later: "As the pubescence is very variable within *A. trifurcata*, this affords no possible means of differentiating between the two plants." Since on page 1555 he referred typical specimens of *A. hyperborea* from Healy, Alaska (A. E. & R. T. Porsild, No. 374) to *A. alaskana*, the above remark should be considered in the light of the paucity and immature condition of the type of *A. hyperborea* and the misleading figure given by Macoun & Holm, l.c. (*see* above).

Distribution: Apparently endemic to northwestern Mackenzie District and mountains of central Alaska.

Artemisia Richardsoniana Bess. in Bull. Soc. Nat. Mosc. 9 : 64 (1836), emend Rydb. in N. Am. Fl. 34, 3 : 261 (1916).

(Plate XXIV, figures 1-3)

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 12, 25, and 31; Cape Lambton, No. 17602; Sachs Harbour, No. 17531, *ibid.*, Manning and Sparrow, No. 247; Bernard Island, No. 17760; Prince of Wales Strait, 20 miles south of Russell Point, No. 17770. Victoria Island: Read Island, Nos. 17212-3; noted at Holman Post; head of Minto Inlet, Nos. 17420 and 17422; Walker Bay, No. 17500; Minto Inlet, Anderson, (Kew!) as *A. borealis*.

Artemisia Richardsoniana, like *A. hyperborea*, is endemic to arctic northwest America and, although described more than a hundred years ago, has remained one of the least known and most rarely collected arctic N. American plants. For this reason it is poorly, if at all, represented in arctic herbaria.

The naming of the Richardson plant got off to a bad start, for Besser first referred it to *A. borealis* Pall.; then, realizing his error, he described it as *A. arctica* Bess., overlooking the earlier *A. arctica* Less., and finally, in 1836, substituted *A. Richardsoniana* Bess.

In actual fact it is not certain for which plant Besser intended the latter name, for the type sheet at Kew contains 7 specimens of *A. hyperborea* Rydb. and 2 of *A. Richardsoniana* Bess. emend. Rydberg. In the centre of the sheet Hooker has written "Arctic Sea coast. Richardson", and in the lower right corner, first "*A. borealis* Pall.," and above that, "*A. arctica*"; finally, these two names have been crossed out and "*A. Richardsoniana*" added in pencil.

I have been unable to ascertain from the Hooker correspondence preserved at Kew if Besser actually saw the *Artemisia* material now preserved at Kew, or if a duplicate set was sent to him. Most likely he did see it, for such phrases as "*periclinii squamis fuscis scariosis*" and "*foliis subsericeis radicalibus longe petiolatis*" contained in the original description of *A. arctica* Bess. in Besser's Monograph (1832, p. 66) strongly point to the presence in the material then before him of *A. hyperborea* Rydb. In the amended description of *A. arctica* Bess., published in Fl. Bor.-Am. two years later, the latter phrase has been left out, but the first remains. Otherwise the description is so general that it equally well applies to either species. Fortunately we have an "aside" by Hooker inserted into Besser's description. This reads "(Two of the specimens in this collection have the whole plant clothed with long silky hairs. H.)", and unequivocally links these two specimens to the plant that Rydberg (1916) redescribed under the name of *A. Richardsoniana* Bess.

Although Rydberg, l.c., placed *A. Richardsoniana* in the subgenus *Abrotanum*, sect. *Norvegicae*, an examination of the flowering heads of the isotype, as well as of the fresher and better material now on hand, clearly shows the disc flowers to be sterile and with undivided stigmas. *A. Richardsoniana* thus rightly belongs in the subgenus *Dracunculus* and undoubtedly is closely related to *A. borealis* Pall., to which it bears considerable resemblance, as was indeed noted by Besser, l.c., and more recently expressed by Hultén (Fl. Alas. & Yukon, p. 1556). This resemblance is most evident in mature specimens that have lost their long and very remarkable pubescence, so characteristic for our plant.

Hultén, l.c., pp. 1561–64, has suggested that the name *A. borealis* Pall. should be reserved for the large-headed spiciform, and somewhat woolly circumpolar arctic plant, in which the stem leaves and bracts of the inflorescence are always lobed, whereas the less arctic and small headed plant with entire stem leaves and bracts (*A. borealis* α *Purshii* Bess., *A. spithamaea* Pursh, and *A. groenlandica* Wormskj.) be considered a geographical race: ssp. *Purshii* (Bess.) Hult. Unfortunately the demarcation between the latter and the still less arctic *A. canadensis* Michx., *A. camporum* Rydb., *A. McCallae* Rydb., and *A. pacifica* Nutt. is not always clear, as evidenced by the diverse and not infrequently conflicting opinions of Fernald, Rydberg, Hultén, and other students who have examined and annotated the large material of the *A. borealis–A. canadensis* complex in the National Herbarium of Canada

The taxonomic status of *A. Richardsoniana,* which perhaps might otherwise be considered a rather distinct geographic race of *A. borealis,* is further complicated by *A. aleutica* Hult. (Bot. Not. 1929, p. 829, fig. 2), which, from the description and illustration, differs from *A. Richardsoniana* chiefly in its narrow, bract-like outer phyllaries. Hultén, Fl. Alas. & Yukon, p. 1556, in distinguishing *A. aleutica* from *A. Richardsoniana,* refers to the "glabrous corolla" of the former, but in the original diagnosis he described the corollas as: "glabris vel pilis singularibus villosis munitis"; whereas Rydberg described those of *A. Richardsoniana* as "slightly villous at the apex or wholly glabrous." In the large series of *A. Richardsoniana* now before the writer, the corollas are, as a matter of fact, totally glabrous.

It would seem best, therefore, until a complete revision has been made of the American members of the subgenus *Dracunculus,* preferably supported by cytological evidence and experimental methods of taxonomy, to consider *A. Richardsoniana* an endemic of arctic northwest America, and specifically distinct from *A. borealis* Pall.

Distribution: Endemic of arctic northwest America: Arctic Coast between Mackenzie and Bathurst Inlet, Banks and Victoria islands, and the north coast of Alaska (Spetzman, Nos. 2159 and 2534).

Artemisia Tilesii Ledeb.

Banks Island: Castel Bay, Manning and Sparrow, No. 185.

The species, which apparently is rare in Banks Island, belongs in the small element of Beringian species that has crossed the Mackenzie River and also reached the Arctic Archipelago.

Distribution: Arctic and subarctic E. Asia, Alaska, and Yukon over Great Bear Lake and the Arctic Coast, reaching Bathurst Inlet and the upper Thelon.

Petasites frigidus (L.) Fr.—Simmons, 1913, p. 128.

Banks Island: Nelson Head, Manning and Macpherson, No. 80; Cape Lambton, No. 17606; Storkerson Bay, Manning and Macpherson, No. 141; Bernard Island, No. 17762; Cape Crozier, Manning and Macpherson, No. 170; Castel Bay, Manning and Sparrow, No. 187; Mercy

Bay, Miertsch. (Kew!). Victoria Island: Minto Inlet, Anderson (Kew!). Melville Island: Winter Harbour (Kew!). Prince Patrick Island: Mould Bay, MacDonald, No. 168.

Somewhat rare and perhaps limited to moist grassy south slopes with abundant snow cover.

Distribution: Arctic and subarctic Europe and Asia and western N. America, from Alaska east to about long. 100° W., north to Melville Island and south to lat. 60°, doubtfully recorded from mountains of British Columbia and Washington.

Arnica alpina (L.) Olin ssp. **angustifolia** (J. Vahl) Maguire.

A. alpina, Simmons, 1913, p. 128; Macoun & Holm, 1921, p. 22.

Banks Island: De Salis Bay, Manning and Macpherson, No. 27; Nelson Head, 30 cm. high, fruiting and flowering specimens on August 29, No. 17789; *ibid.*, Manning and Macpherson, Nos. 90 and 102; Cape Lambton, No. 17601; Mercy Bay, Miertsch. (Kew!); *ibid.*, Manning and Sparrow, No. 222; Russell Point, No. 17728. Victoria Island: Wollaston Peninsula, C.A.E., No. 335b; Holman Post, No. 17336; Minto Inlet, Anderson (Kew!); Washburn Lake, No. 17460. Melville Island (acc. to Simmons). Axel Heiberg Island: Head of Mokka Fd., No. 18720.

Local and usually restricted to grassy ledges and south-facing screes, frequently growing below bird rocks or near the nesting sites of hawks or falcons.

Distribution: From Brooks Range, Alaska, across arctic and subarctic Canada and the Arctic Archipelago, north in Ellesmere Island beyond lat. 81° N., south to approximately lat. 56° N., in Ungava, to lat. 60° in Keewatin and to lat. 50° in the Rocky Mountains; northern E. and W. Greenland, also in Spitsbergen.

Senecio atropurpureus (Ledeb.) Fedtsch. *See* Porsild in Nat. Mus. Canada, Bull. 101 : 27 (1945).

S. frigidus, Simmons, 1913, p. 129.

Banks Island: De Salis Bay, Manning and Macpherson, Nos. 23 and 48; Cape Lambton, No. 17607; Sachs Harbour, No. 17532; Storkerson Bay, Manning and Sparrow, No. 143; Castel Bay, Jenness, No. 60; *ibid.*, Manning and Sparrow, No. 188; Baring Land, M'Clure, September 1850 (Kew!); Mercy Bay, Manning and Sparrow, Nos. 224-5; Russell Point, No. 17731. Victoria Island: Wollaston Peninsula, C.A.E., No. 329a; Holman Post, No. 17343 (var. *Ulmeri*); Minto Inlet, Anderson (Kew!).

Occasional to common in wet, mossy tundra. No. 17343 from Holman Post is the large-headed and leafy var. *Ulmeri* (Steffen) Porsild, heretofore known only from mountains of Alaska and Yukon.

Distribution: Arctic Asia and N.W. America from Alaska east through Yukon and northern Mackenzie to Bathurst Inlet, north to Banks Island, south to Great Bear Lake, and in the northern Rocky Mountains to about lat. 60° N.

Senecio congestus (R. Br.) DC.

S. palustris, Simmons, 1913, p. 129.

S. palustris var. *congestus*, Macoun & Holm, 1921, p. 22.

Banks Island: De Salis Bay, Manning and Macpherson, No. 11; Storkerson Bay, *idem*, No. 142; Castel Bay, Jenness, No. 57; Mercy Bay, Miertsch. (Kew!); *ibid.*, Manning and Sparrow, No. 226; noted as common at Russell Point. Victoria Island: Wollaston Peninsula, C.A.E, Nos. 401 and 414; Minto Inlet and Cambridge Bay, Anderson (Kew!), head of Minto Inlet, No. 17426; Cambridge Bay, Fortier, No. 25; noted as common at Read Island and Holman Post. Melville Island (acc. to Simmons, l.c.). King William Island: 5th Thule Expedition, No. 1225.

Common locally on muddy edges of ponds, on sheltered sea-beaches, and along water seepages. The species is strongly nitrophilous, and at Cambridge Bay and Holman Post tall and luxuriant specimens grew in wet places near dog kennels and refuse heaps.

Distribution: Circumpolar arctic-subarctic. In N. America from Alaska to Baffin Island and Labrador, north to Melville and Resolution islands, south to Labrador – Hudson Bay. Wanting in Greenland.

Senecio hyperborealis Greene.

Banks Island: Nelson Head, on coastal flats back of boulder beach, flowering specimens and young fruits, July 21, 1952, Manning and Macpherson, No. 105.

A pronounced calciphile, endemic of boreal northwest America otherwise known from S.W. Alaska through Yukon to Great Bear Lake, north to the arctic coast of the Mackenzie District.

Taraxacum hyparcticum Dahlst.—Simmons, 1913, p. 130.

Banks Island: De Salis Bay, Manning and Macpherson, No. 28; Cape Lambton, No. 17610; Mercy Bay, No. 17763; *ibid.*, Manning and Sparrow, No. 227; Russell Point, No. 17732. Victoria Island: Holman Post, No. 17346; head of Minto Inlet, No. 17428; noted at Cambridge Bay; south coast, Rae (Kew!); Minto Inlet and Cambridge Bay, Anderson (Kew!). Melville Island (acc. to Simmons). Prince Patrick Island: Mould Bay, MacDonald, No. 36.

Taraxacum hyparcticum is perhaps the most common member of the genus in Banks and Victoria islands, where it was generally found on south-facing screes watered by snowbanks. It is a pronounced nitrophile as shown by its luxuriant growth below bird cliffs and near human habitation. It is a strikingly handsome species, which forms large clumps, in one instance bearing 80 flowering scapes, up to 20 cm. tall, from the same root (No. 17346). The expanded flowering heads are relatively large, up to 3 cm. in diameter, and the corollas pale yellow to creamy white, often with a tinge of pink. In all flowers examined, the stigmas were devoid of pollen. In mature fruits the beak is up to 7 mm. long. The writer is quite unable to follow Polunin (1940), who, with Fernald, Rhod. 35:373 (1933), reduced *T. hyparcticum* to synonymy under *T. phymatocarpum*.

The latter is of entirely different ecological habit and is a much smaller plant, rarely producing more than a few usually weak scapes bearing much smaller, nodding, or even recumbent, flowering heads that never expand during anthesis.

Distribution: High-arctic in N. America, known from northwest Greenland across the Arctic Archipelago. According to Haglund in Hult. Fl. Alas. & Yukon, also known from Cape Thompson, Alaska, and from Novaya Zemlya.

Taraxacum lacerum Greene.

T. ceratophorum, Simmons, 1913, p. 130.

T. hyperboreum Dahlst. in Ostenf., 1910.

Banks Island: Cape Lambton, grassy places below gull cliff, No. 17608; north shore, M'Clure (Kew!); Castel Bay, Jenness, No. 49; Russell Point, very sparse on owl perches, No. 17733. Victoria Island: Holman Post, rocky talus, No. 17345, and on grassy places near the beach, No. 17344; head of Minto Inlet, No. 17429. Prince Patrick Island: Mould Bay, MacDonald, No. 170. Melville Island (acc. to Simmons). King William Island (acc. to Dahlstedt, l.c.), *ibid.*, Larsen, No. 50. Boothia Peninsula: Spence Bay (acc. to Cody, l.c.).

A decidedly nitrophilous species, which in Banks and Victoria islands is rare to occasional in grassy places, often near the sea-beach.

Distribution: Arctic and subarctic N. America from Alaska to Baffin Island, Labrador, and W. Greenland. South to mountains of Alberta and Newfoundland and Mingan Islands.

Taraxacum phymatocarpum J. Vahl.—Simmons, 1913, p. 130.

Banks Island: De Salis Bay, on owl perches, No. 17641; *ibid.*, Manning and Macpherson, No. 41; Cape Lambton, Nos. 17609 and 17611; Castel Bay, Manning and Sparrow, No. 189. Victoria Island: Read Island, No. 17215; head of Minto Inlet, No. 17427; Richard Collinson Inlet, Jenness No. 10. Melville Island: (Kew!). Prince Patrick Island: Mould Bay, MacDonald, No. 171. Axel Heiberg Island: Head of Mokka Fd., No. 18723.

Occasional to rare, in clay spots in tundra and frequently on the sides of owl perches. Our specimens are all low, with from 1 to 3, recumbent 5 to 8 cm. long scapes from each root. The heads are from 1 to 1·5 cm. high and remain closed throughout floration; the corollas are deep yellow, never creamy white, and abundant pollen is present; in mature achenes the beak is 5 mm. long. The leaves are variable, often entire or merely with sinuous margins.

Distribution: High-arctic N. America, from Alaska across the Arctic Archipelago to northern E. and W. Greenland, north in Ellesmere Island beyond lat. 83° N., and on the mainland south to the Arctic Coast. Isolated in Newfoundland (acc. to Fernald, l.c., map, p. 122).

Taraxacum pumilum Dahlst.—Simmons, 1906, p. 21, tab. 1, 2; *idem*, 1913, p. 130.

Banks Island: Bernard Island, No. 17764; Cape Crozier, Manning and Macpherson, No. 171; Castel Bay, Manning and Sparrow, No. 228; Russell Point, Nos. 17734-5. Victoria Island: Head of Prince Albert Sound, No. 17447; lake 60 miles north of Cambridge Bay, No. 17478. Melville Island (acc. to Simmons). Prince Patrick Island: MacDonald, No. 37. Axel Heiberg Island: Head of Mokka Fd., Nos. 18724-6. Previously known only from Melville and Ellesmere islands; in the latter place it has recently been collected on the northeast coast at Parr Inlet, MacDonald, No. 52; Eureka Sound, H. H. Aime, No. 15; Slidre Fd., J. S. Tener, No. 113.

Our specimens agree with the original description and with Simmons' illustration, l.c., and differ from *T. phymatocarpum* in the rather deeply runcinate leaves, more expanded flowering heads, and the longer beaks of the achenes. The corollas are deep yellow, and abundant pollen is present.

Distribution: High-arctic; thus far endemic to the Canadian Arctic Archipelago and northernmost Greenland.

Crepis nana Richards.—Macoun & Holm, 1921, p. 23.

Victoria Island: Head of Minto Inlet, No. 17424; 60 miles east of head of Minto Inlet, No. 17506 (both collections by Mrs. L. A. Washburn), Wollaston Peninsula, C.A.E., No. 403.

Distribution: Eastern Asia, arctic and alpine N. America. A pronounced calciphile, which by preference grows in unstable slide-rock and gravel; of spotty distribution from Alaska to northern Labrador, north to northern Baffin Island, south through the Rocky Mountains to California, New Mexico, and Nevada. Isolated in northwest Newfoundland.

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PLATE II

A. Nelson Head, from the east.

B. Plateau between Nelson Head and Masik Pass in most places is covered by a thick mantle of angular rocks weathered *in situ*. The small esker on the skyline above the lake is approximately 2,400 feet above sea-level.

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PLATE III

A. Close-up of fossil rock stripes on plateau above Nelson Head. Vegetation is sparse and confined to the middle part of the slope.

B. Diabase cliffs at south end of Thesiger Bay.

PLATE IV

A. Lush vegetation on the scree below cliffs shown in Plate III B. *Arnica alpina* ssp. *angustifolia*, *Dryopteris fragrans*, and *Saxifraga tricuspidata*.

B. Looking east across the interior of southeastern Banks Island, about 20 miles west of Prince of Wales Strait. Note feebly integrated drainage and shallow lakes that in 1949 were free from ice towards the end of July.

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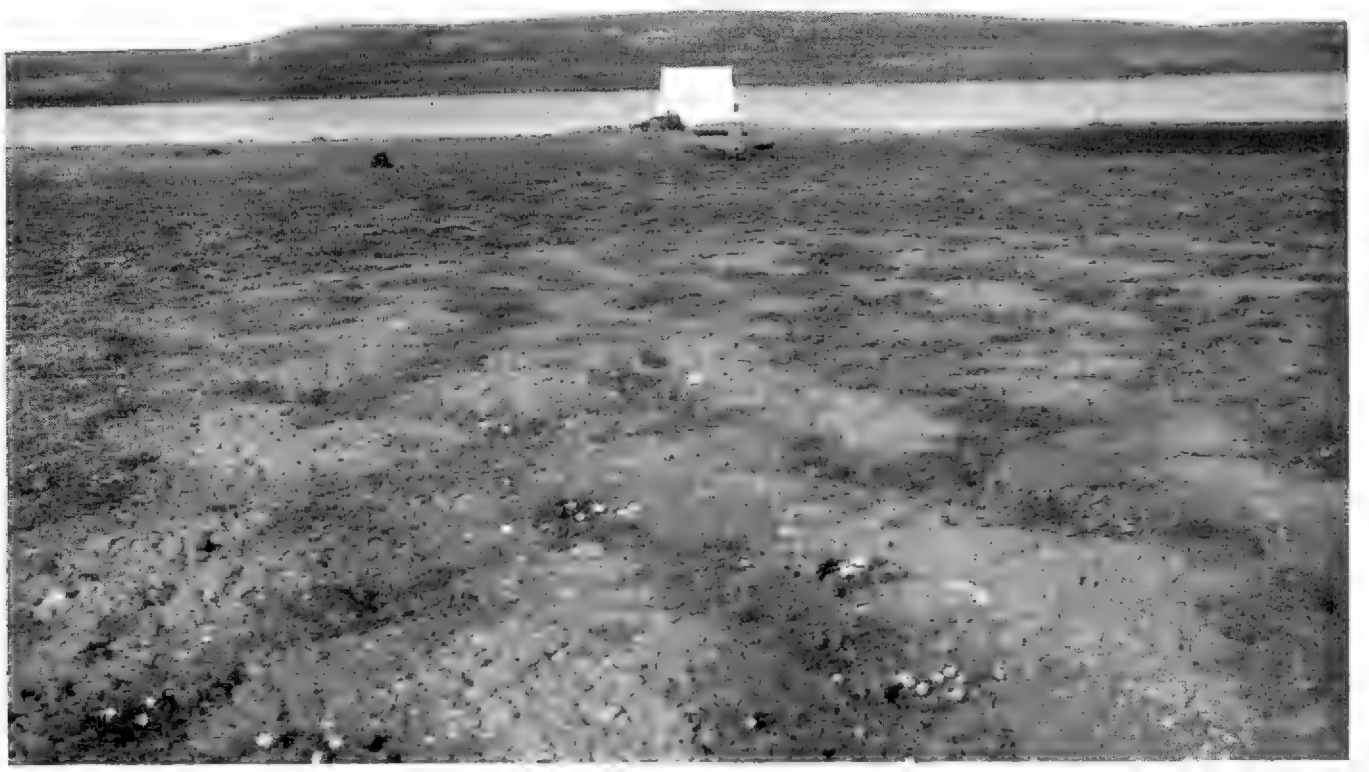
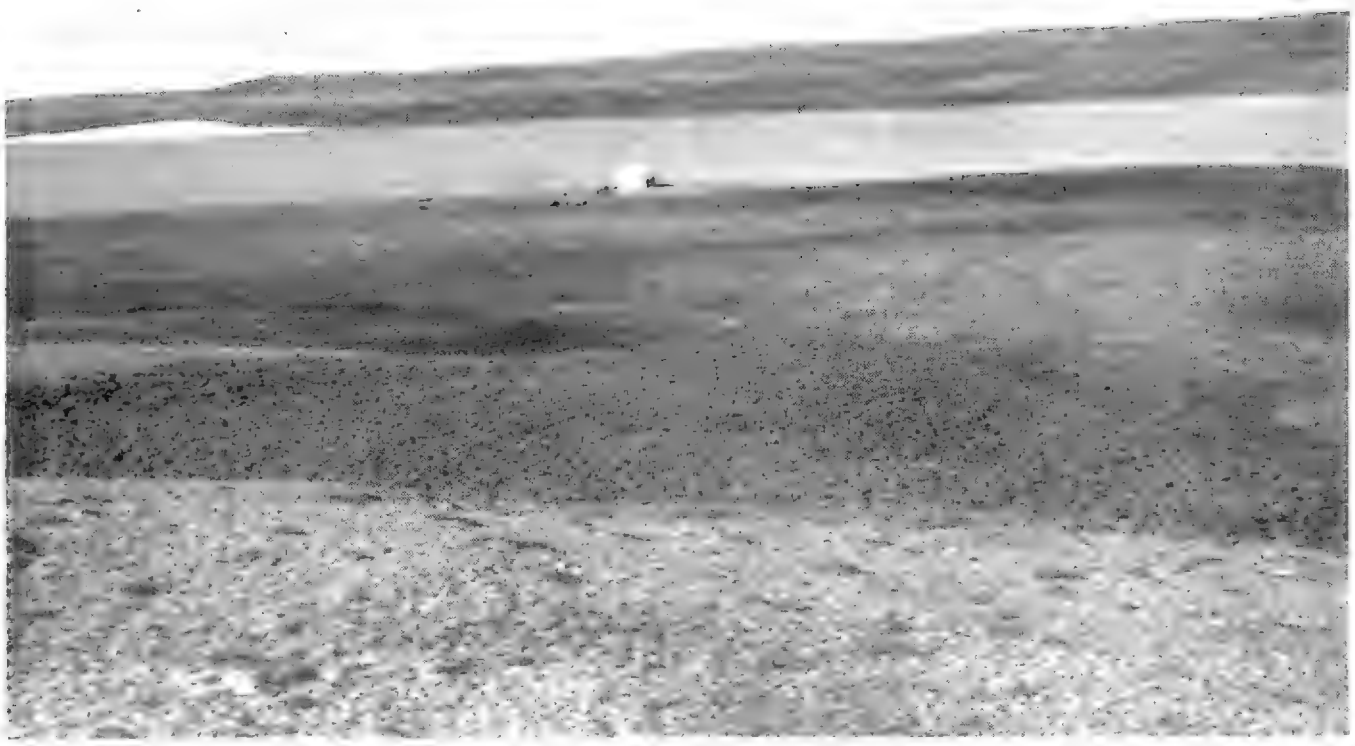
PLATE V

A. Strand terrace by lake in northeastern Banks Island looking northeast towards Prince of Wales Strait. Elevation of lake is 425 feet above sea-level. Note solifluction stripes on gently sloping ground to the right. Glacial drumlin on skyline near top of escarpment; pits dug into strandline at 600 feet above sea-level revealed marine shells.

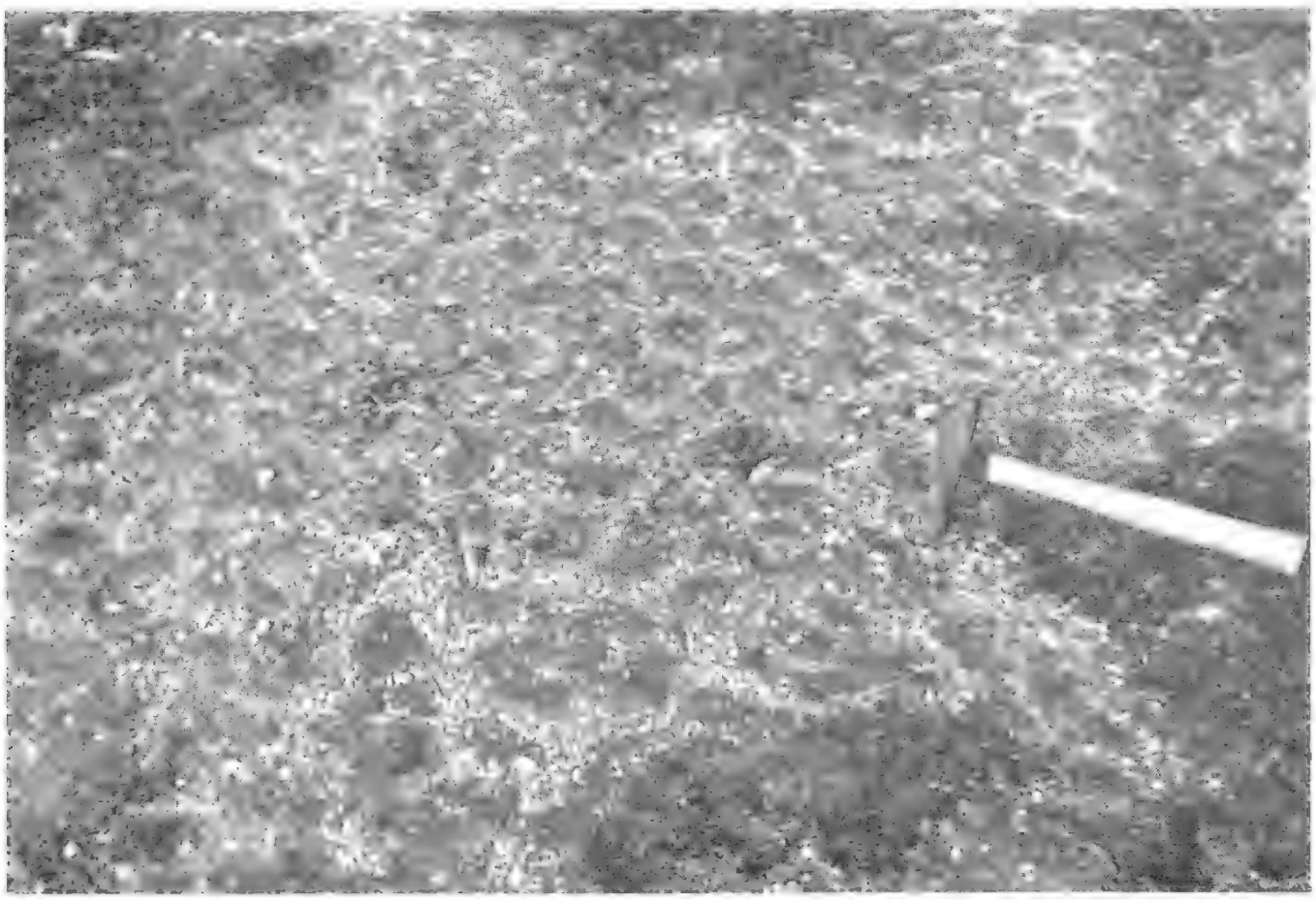


B. Close-up of solifluction stripes and oblong mud polygons shown in centre of plate. The centre of polygons is without vegetation. Between the stripes grow *Dryas integrifolia* and *Salix arctica*.

PLATE VI



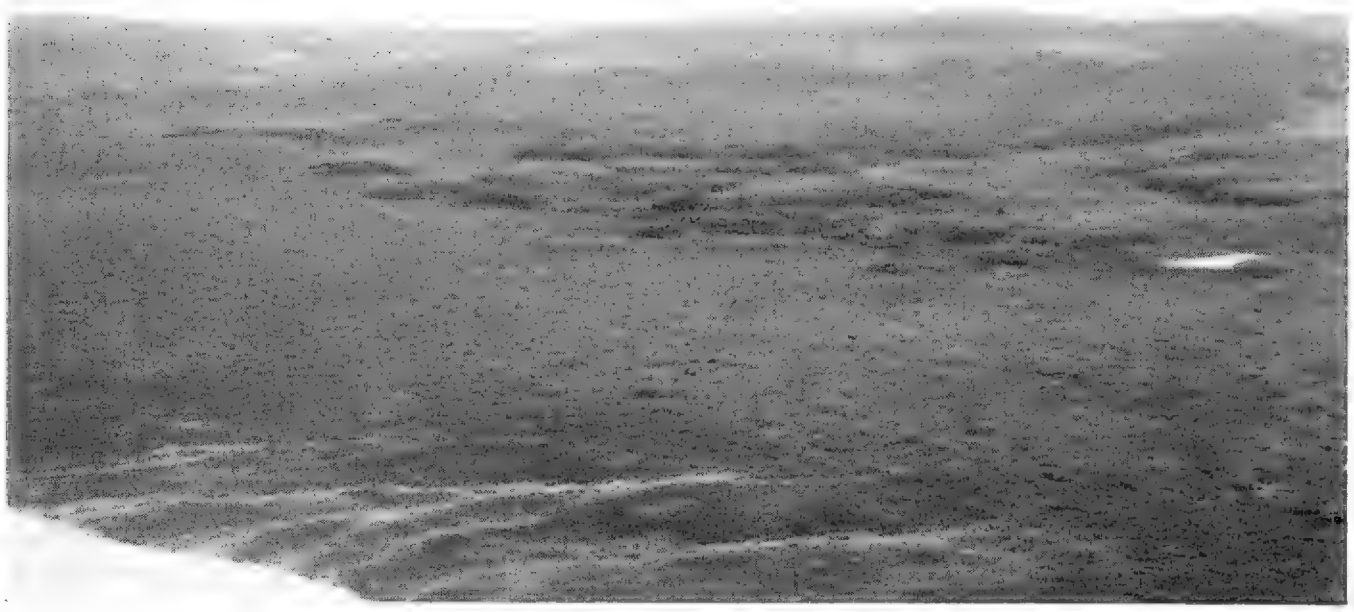
A. Consolidated mud-flow in depression between ridges completely covered by hummocks of *Dryas integrifolia*.



B. Close-up of soil polygons entirely devoid of vegetation.

PLATE VII

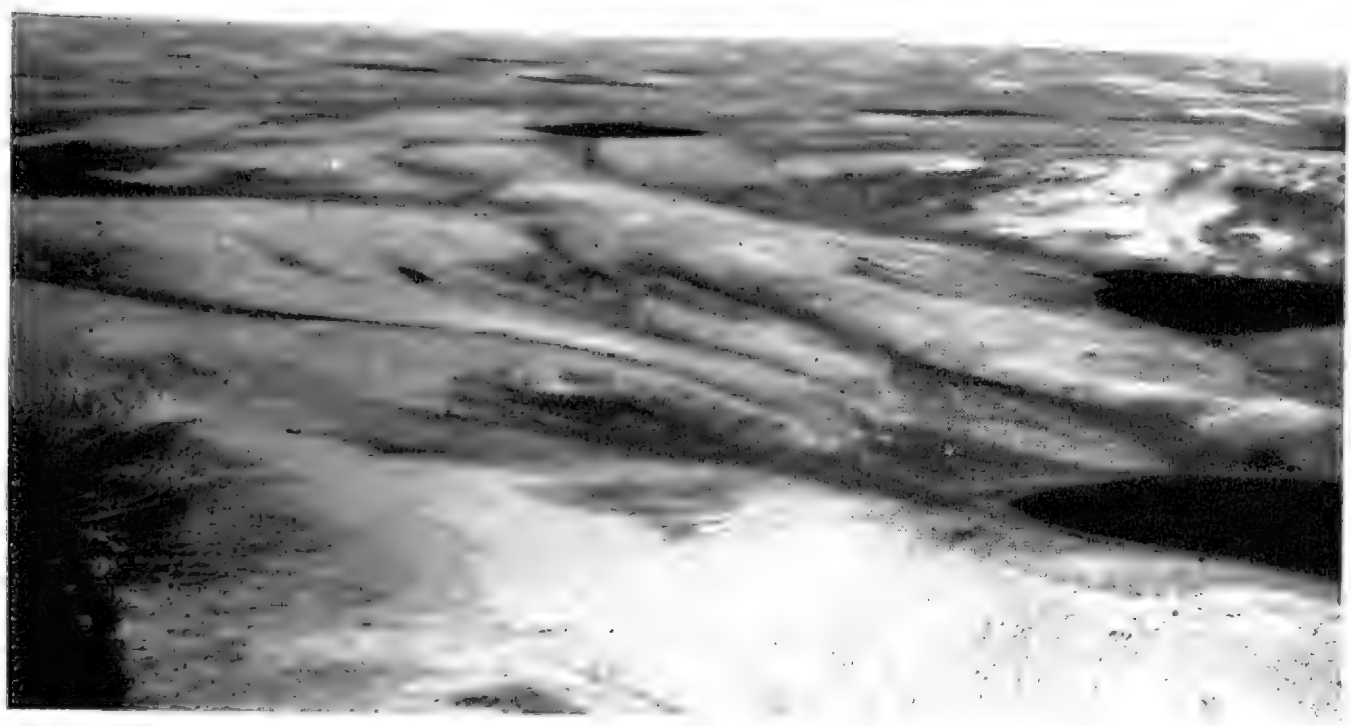
A. Hummock formed around a rock on which snowy owls perch. A thick mantle composed of fibrous raw humus and lemming bones has formed around the base of the rock. Owl perches afforded rich collecting grounds for the botanist.



B. Shallow depression in northeastern Banks Island with thick deposits of raw peat and remnants of a collapsed pingo. In left foreground are the remains of a large snowdrift, which did not completely melt in 1949.

PLATE VIII

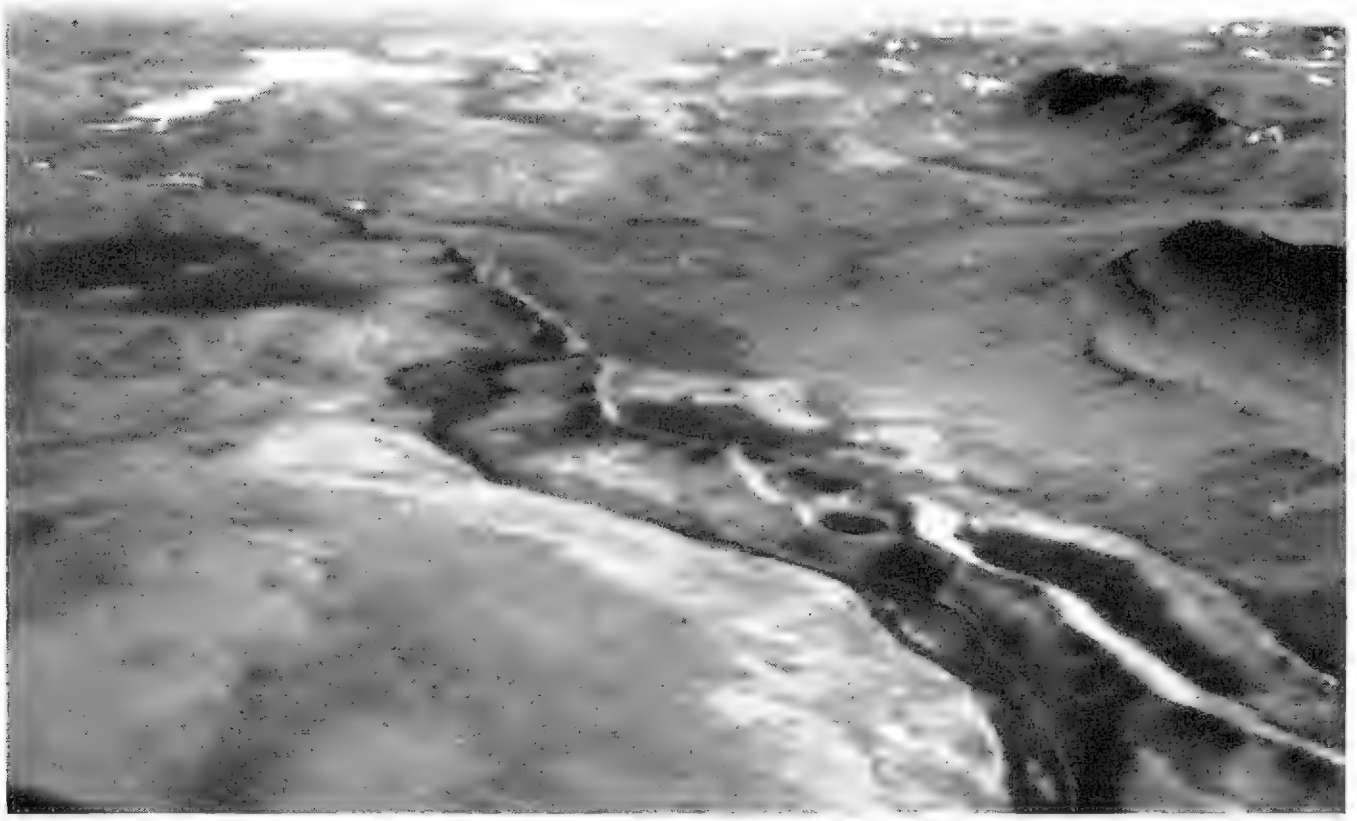
A. Remnants of collapsed pingo consisting entirely of raw peat of 2- to 3-foot thickness covering a core of ice. In low places around the pingo *Eriophorum Scheuchzeri* bog.



B. Rolling coastal plateau between Holman Island and Cape Wollaston, southwestern Victoria Island. Note feebly integrated drainage and the smooth and rounded relief of the landscape owing to extreme mass wastage and soil flow, clearly seen in foreground. Photo from 2,000-foot elevation.

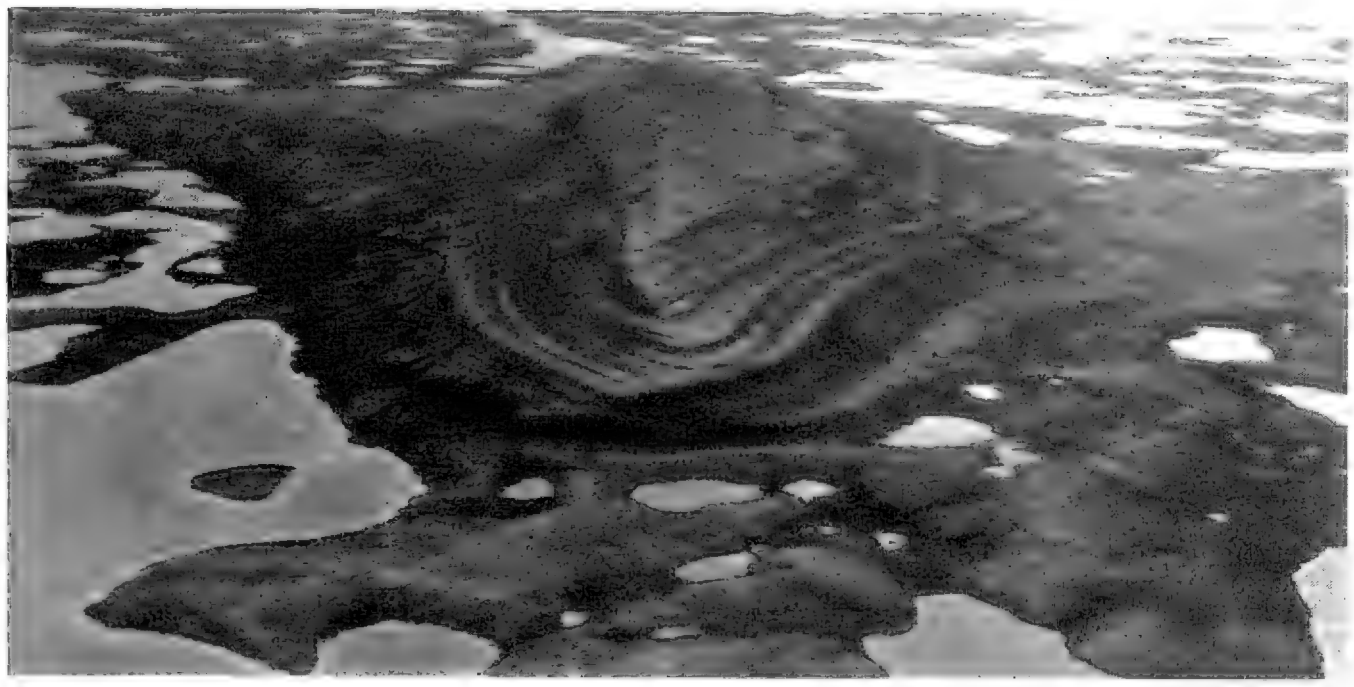
PLATE IX

A. Interior of Victoria Island, 40 miles north of the head of Prince Albert Sound. The banks of the narrow lake are formed by 20-to 30-foot cliffs of coarse-grained, non-fossiliferous limestone, almost entirely devoid of vegetation.



B. Esker trending approximately E-W for a distance of six or seven miles near the head of Minto Inlet. Summit of hill to the right is 1,000 feet above sea-level.

PLATE X



Top: Northwest end of Mount Pelly. Middle: Landslide benches on northeast side of Mount Pelly. Bottom: Solifluction sheet encroaching upon emerged strandlines. Northeast side of Mount Pelly. All from Geol. Soc. Amer. Mem. 22:1-142 (1947).

PLATE XI

A. Straight solifluction front encroaching upon an emerged strand. Northeast nose of Mount Pelly. From Geol. Soc. Amer. Mem. 22:1-142 (1947).

B. Lobate solifluction front. Northeast side of Mount Pelly. From Geol. Soc. Amer. Mem. 22:1-142 (1947).

PLATE XII

Puccinellia vacillans (Fr.) Schol. (*Phippsia algida* x *Colpodium Vahlianum*): Figure 1, flowering plant, × 3/5; Figure 2, panicle with 2, 3, or even 4-flowered spikelets, × 2/1, Aug. 2, 1927, M. O. Malte, CAN, No. 118852 (Craig Harbour, Ellesmere Island).

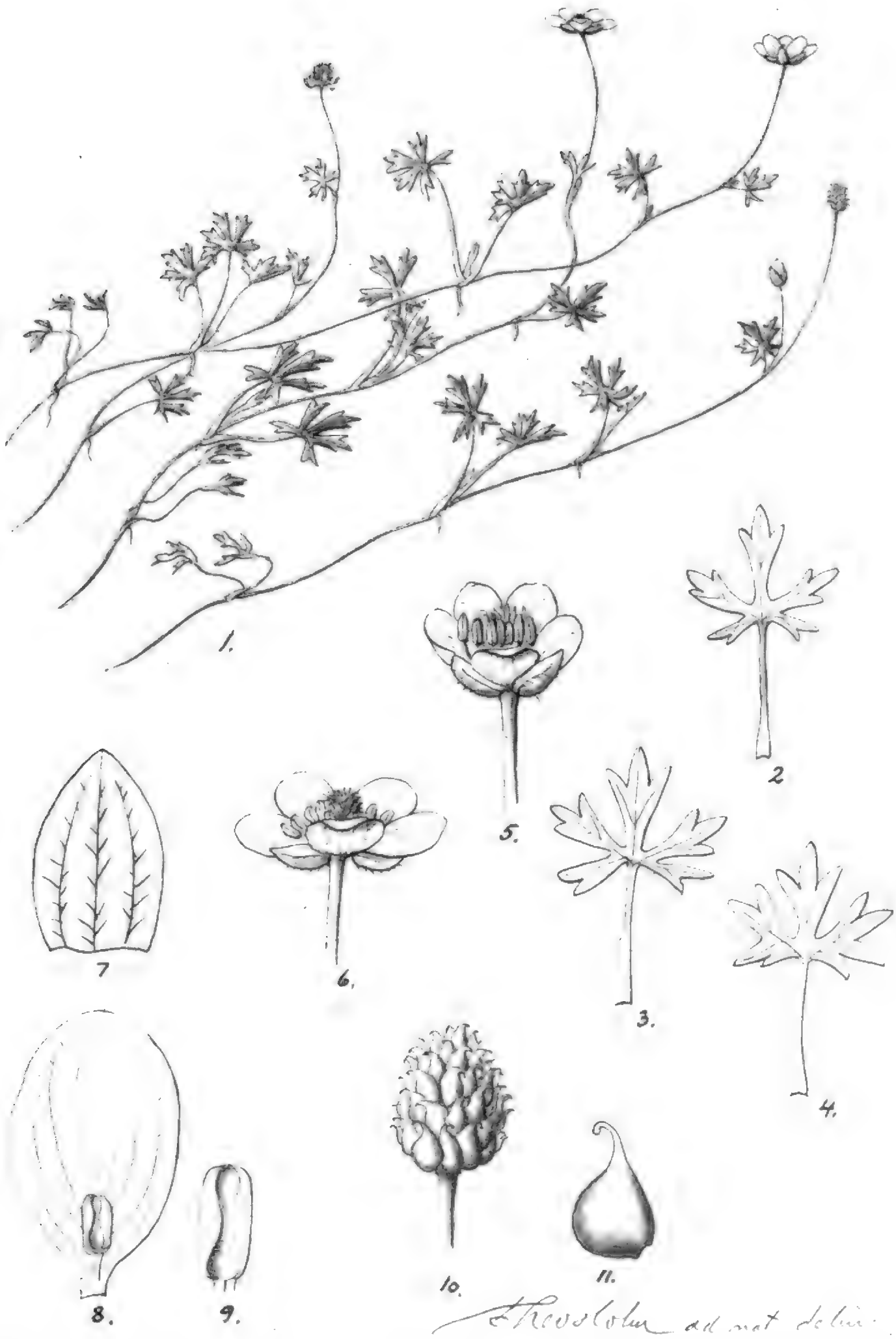
PLATE XIII

Poa alpigena (Fr.) Lindm. var. *colpodea* (Fr.) Schol.: Figure 1, flowering plant, × 2/5, MacDonald, No. 68 (Prince Patrick Island). Viviparous plant, × 2/5, Porsild, No. 17654 (Banks Island).

PLATE XIV

Eriophorum triste (Fr.) Hadăc & Löve: Figure 1, fruiting plant, × 4/7, Porsild, No. 5324 (Great Bear Lake); Figure 2, flowering head, × 3/1, Manning & Macpherson, No. 57 (Banks Island).

PLATE XV



Ranunculus Gmelini DC.: Figure 1, flowering plant, × 1/1; Figures 2-4, mature leaves, × 3/1; Figures 5 and 6, expanded flowers, × 3/1; Figure 7, sepal, × 10/1; Figure 8, petal, front view showing nectary, × 10/1; Figure 9, nectary removed from petal, × 10/1; Figure 10, fruit, × 5/1; Figure 11, × 15/1, carpel. Del. Theo. Holm, from specimen from Yukon.

Draba Bellii Holm var. *gracilis* Ekm.: fruiting plant, × 1/1 (Banks Island), Porsild, No. 17693.

PLATE XVII

Draba oblongata R. Br.: plants with young fruits, × 7/3, MacDonald, No. 129 (Prince Patrick Island).

PLATE XVIII

Saxifraga caespitosa L. s p. *uniflora* (R. Br.) n. comb.; young fruiting axes to which adhere dust particles and grains of sand, × 5/1, R. Bartlett, No. 32 (Booth Sound, N.W. Greenland).

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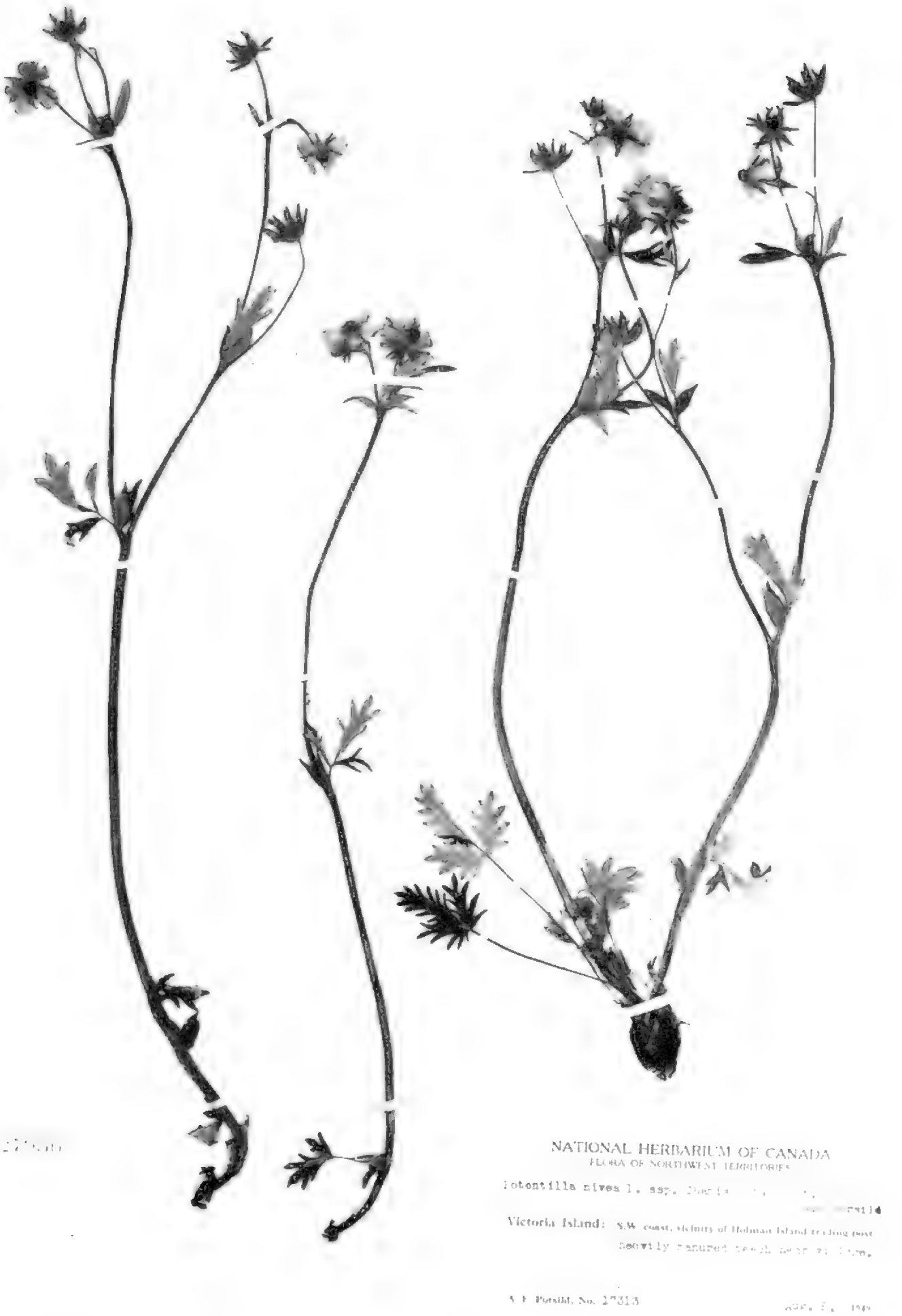
PLATE XIX

Saxifraga caespitosa L. ssp. *uniflora* (R. Br.) n. comb.: Figure 1, flowering plant, × 7/5, MacDonald, No. 40 (Ellesmere Island); Figure 2, fruiting plant, × 7/5, Baldwin, No. 1887 (Prince Charles Island, Foxe Basin).

PLATE XX



Potentilla nivea L. ssp. *Chamissonis* (Hult.) Hiit.: flowering plant, × 2/5, Porsild, No. 17313 (Victoria Island).

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Potentilla Ledebouriana Porsild: Figures 1-3, flowering plants, Porsild & Breitung, Nos. 15860 and 13586; Figure 4, fruiting plant, Porsild & Breitung, No. 14175. All × 3/4 (Banff National Park, Alberta).

PLATE XXII

Erigeron grandiflorus Hook.: Figure 1, flowering plant, × 3/4, Porsild, No. 17342 (Victoria Island); Figure 2, flowering plant, × 3/4, Nelson & Murie, No. 180 (Mt. McKinley Park, Alaska, Herb. R.M.); Figures 3 and 4, flowering plants, × 3/4, Porsild, No. 18209 (Upper Red Deer River, Alberta, near type locality).

PLATE XXIII

Artemisia hyperborea Rydb.: Figures 1 and 2, flowering plants from Victoria Island, Porsild, No. 17338; Figure 3, fruiting plant from Mackenzie Delta, East Branch, Porsild, No. 7278. All × 1/2.

PLATE XXIV

Artemisia Richardsoniana Besser: Figure 1, fruiting plant, Minto Inlet, Victoria Island, Porsild, No. 17420; Figures 2 and 3, flowering plants, Read Island, Porsild, No. 17213 and De Salis Bay, Banks Island, Manning & Macpherson, No. 25. All × 1/2.

INDEX TO LATIN NAMES

Roman type is used for Western Arctic Archipelago plants listed in Catalogue (pp. 67-190).

Italic type is used to indicate synonyms, as well as species belonging in the flora of the Canadian Eastern Arctic but not as yet recorded from the western islands of the Archipelago, or for the names of species mentioned only incidentally in the text.

Names printed in **bold-face** indicate new species, new names, and new combinations.

Bold-face numerals indicate the page on which the principal discussion of each species is given. An asterisk (*) following a numeral denotes an illustration, a dagger (†), a map.

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